

Boeing 787 Series Specialist Composite Training



- ⤴ As the world class provider of composite training North Composites Engineering (NCE) incorporating Aeroskills International provide composite repair and the latest metal to metal bonding training to the aircraft composite sector.
- ⤴ Independent specialist training for Boeing 787 aircraft.
- ⤴ Our courses provide the practical skills and development to enable staff to work directly on aircraft repair after course completion.
- ⤴ We comply with the training requirements to validate the CAA licence with regard to composite repair.
- ⤴ Specialist BAE Systems approved trainer for military aircraft composite repair courses.
- ⤴ Our services include active repair, project management, specialist advice, plant and equipment specifications to comply with productivity and safety requirements.



Boeing 787 Series Content

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Boeing 787 Structural Repair Course Schedule 2020

Course Code	Title	Date	Price*
P1-787	Structural Repair Manual (SRM) - Structural Composites	1 st – 5 th June 2020 28 th September- 2 nd October 2020	£1,250.00
P2-787	P2-787 Structural Repair - Composites	15 th – 26 th June 2020 12 th – 23 rd October 2020	£2,500.00
P3-787	Structural Composite Repair Training for Technician with Advanced Methods	29 th June – 3 rd July 2020 26 th - 30 th October 2020	£1,760.00
P4-787	P4-787 Advanced Composite Analysis for Engineers	17 th – 21 st August 2020 30 th November – 4 th December 2020	£1450.00
P5-787	Composite Repair for Quality Assurance Inspectors	27 th July – 7 th August 2020 16 th – 27 th November 2020	£3,385.00
AC001	Advanced Aircraft Composite Repair 1	9 th -20 th March 2020 11 th - 22 nd May 2020 13 th – 24 th July 2020 7 th – 18 th September 2020 2 nd – 13 th November 2020	£1850.00

*All quoted prices are subject to VAT at the standard rate at the time of booking.

787 Structural Composite Repair Course Overview

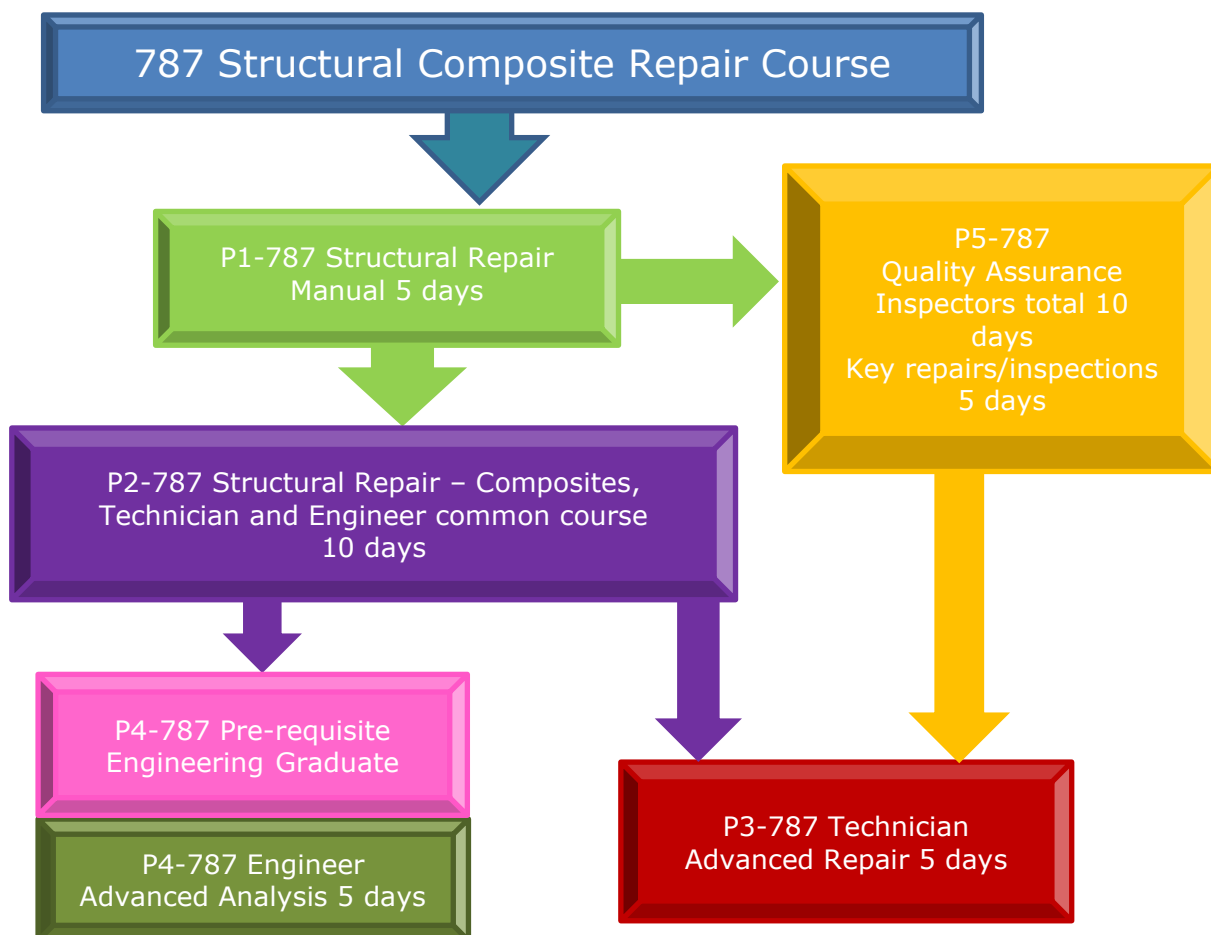
The 787 aircraft has extensive use of composite structures, when damaged they require new and specific 787 composite repair procedures, which vary from other aircraft types and is compatible with the Boeing 787 specification for structural composite repair training.

The course is designed for engineers, technicians and quality assurance inspectors to provide structural composite repair knowledge to enable them to effectively undertake compliant activities within their work role. This is achieved through specific 787 training, starting with the mandatory 787 SRM training course, followed by training related to the delegates assigned responsibilities to validate their licence approval.

The 787 technicians course provides extensive practical structural composite repair training, the 787 engineers course embraces practical and theoretical calculations to assist a design authority to specify a repair that is outside the SRM parameters, while the quality assurance inspectors course provides both practical and inspection knowledge to verify the compliance of 787 structural composite repairs.

Our cost effective dedicated 787 composite repair courses are design to fully comply with Boeing requirements for the 787 technician, 787 engineer and 787 quality assurance inspectors to attain competence in their respective work roles. We continually strive towards training improvements through documentary tracking and especially the delegate requirements.

Those delegates who undertake repairs to other aircraft types and manufactures are advised to undertake our general aircraft courses found at www.Aeroskills.co.uk or contact to discuss your requirements Tel:+44(0)1942665292, email:info@aeroskills.co.uk



Entry to P1-787 has a pre-requisite of AC001

Course Descriptions

Course Title: P1-787 Structural Repair Manual (SRM) - Structural Composites

Course Code: P1-787

Duration: 5 Days

Course structure: 100% application through case studies

Who is it for: The course is suitable for aircraft composite repair technicians, engineers and quality assurance inspectors who have undertaken our general aircraft composite repair courses AC001 and is a prerequisite course for those planning to take the specialised 787 structural repair technician's, engineer's or quality assurance inspectors courses.

This course provides the delegate with the knowledge and skill to effectively use the 787 Structural Repair Manual (SRM) to appreciate or verify repairs carried out with the 787 repair methods.

The primary focus is Chapter 51 composites repair processes, structural identification, allowable damage and repair within SRM limits. The course enables the delegate to experience and carry out structural composite repairs with detailed scenarios to assist the delegates to assess effective repair SRM compliance, damage limits and repair compliant options available at various locations on 787 aircraft.

To satisfy Boeing requirements for composite structural repair on the 787 a multi-part course is required. This part 1 course focuses on an overview of the SRM linked to a series of repair issue assessments.

Course content

This Part 1 course is a mandatory course which must be undertaken before the technician, engineers or quality assurance inspectors course/s. The repairer/quality assurance inspector will have the opportunity, via a series of in-depth case studies, to experience the challenges of the more difficult repairs ahead of their real-world application.

The course aims:

- to provide a wider knowledge of repair situations ahead of a real-world situation.
- to provide confidence and understanding of the structure of the 787 SRM.
- to introduce 787 damage limits and determine if composite damage is repairable within the 787 SRM.
- to identify the new 787 composite repair processes along with composite ply material, sequences and orientations required for various 787 structures.

The course covers:

This SRM course is mandatory so that those repairing the 787 composite structure have knowledge of what is expected across a variety of repair scenarios. This course provides a common level of knowledge and terminology against progressive repair situations. Taking the learner from simple to the more complicated repair needs utilising the correct SRM format, tools, damage assessment, limits and repair materials to form an understanding of the requirements of the 787 chapter 51 requirements ahead of the practical application undertaken in the 787 P-Series courses.

SRM document review followed by repair scenarios e.g.

- Fairing skin repairable damage limits and QCR repairable damage limits
- Lightning strike repair and fuselage bolted skin repairs
- Stringer and skin allowable damage limits
- Door skin and surround allowable damage limits
- Wing strut door allowable damage limits, and repairs.

Course Title: P2-787 Structural Repair - Composites

Course Code: P2-787

Duration: 10 Days

Course structure: 25% theory, 75% practical

Who is it for: Technician and Engineer Common Course. This course prepares the delegates who are technicians or engineers by providing a common experience of repair methods, knowledge and terminology via a highly practical focus of composite structural. The course is a follow-on course from P1-787 Structural Repair Manual; delegates will have satisfactorily completed P1-787 prior to attending this specialist course.

Course content

This course delivers SRM compliant repair training. The course focuses on the latest techniques required to perform composite repairs including bonded, solid (Monolithic) laminate, edge band and face skin repairs. The course explores the types and application of composite materials used on the 787 along with the newest repair techniques. The course also expands the latest bagging techniques and the underlying principles for the new techniques identified within the SRM and links to equipment needed to effectively undertake the repair.

This structural composite repair programme is within our well equipped training workshop, which complies with SRM and the Health and Safety Executive (HSE) stipulations.

Upon completion of the 787 structural repair series of courses the gained knowledge and experience validates the delegates approval licence.

The course aims:

- to provide a knowledge of the materials, equipment, repairs and cure applications specified in the 787 aircraft.
- to equip the delegate with the knowledge to undertake bonded and complex repairs in line with SRM stipulations for the 787.
- to equip the delegate with the knowledge and practical skills required to carry out effective repairs to structural composites and bonded structures for the 787 aircraft.
- to provide the delegates with the appropriate experience of vacuum bagging requirements as set out in the 787 SRM.
- to satisfy all the relevant quality assurance and safety requirements.

The course covers:

Identification of material types, processes of composite monolithic bonded repair, sandwich bonded repair, experience equipment and thermocouple placement used in repair, identification of repair boundaries and material replacement orientation requirement.

This is followed by taper sanding, a wet and a pre-preg bonded repair to carbon sandwich facesheets with cores. Utilisation of approved SRM repair equipment in the correct manner to effectively create a high quality structural composite repair.

Outline of the 787 Composite Structural repairs

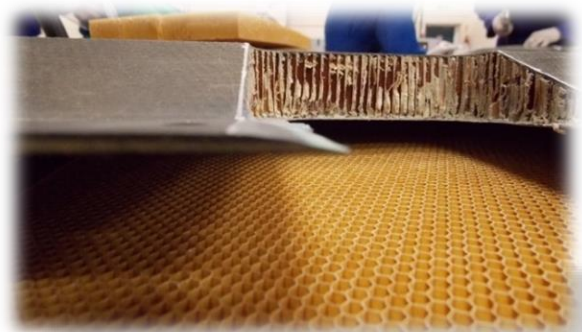
- Composite Materials
- Repair Processing Materials
- Repair Tooling, Facilities, Safety and Storage
- Damage Inspection
- Part Drawing interpretation
- Composite Allowable and Repairable Damage Limit Analysis Assessment
- Develop and experience the processes of:
 - Application of the 787 SRM.
 - Prepreg Composite Sandwich Repair
 - Quick Composite Repair
 - 787 Fuselage Skin Bonded Repair
 - DVD Debulk.

Practical Repair Workshop Activity

Pre-preg cure and repairs to: Facesheet, Edgeband, Fuselage skin and quick repair together with Thermal Survey and Wet lay-up Core and Facesheet repair.

Practical Repair Activities

- Prepreg Cure and Facesheet Repair
- Wet Layup Core and Facesheet Repair
- Edgeband Repair
- Thermal Survey
- Quick Composite Repair
- Fuselage Skin Repair



Course Title: P3-787 Structural Composite Repair Training for Technician with Advanced Methods.

Course Code: P3-787

Duration: 5 Days

Course structure: 10% theory, 90% practical

Who is it for: The advanced extension to the base composite structural repair unit P2-787 Structural Repair - Composites provides focused advanced 787 composite structural repair hands on workshop training for technicians. This unit is carried out after P2-787 to maximise the learning outcome.

Course content

This course delivers SRM compliant repair training. The course focuses on the latest techniques required to perform the more advanced composite repairs including bonded, bolted, fuselage and stringer repairs. The course expands the latest bagging techniques including DVD and the underlying principles for the new techniques identified within the SRM.

The course aims:

- to identify composite repair facility and material storage requirements specific to 787.
- to equip the delegate with the knowledge to undertake bonded, bolted and complex repairs with titanium tooling in line with SRM stipulations for the 787.
- to provide the delegates with the appropriate experience of vacuum bagging and double vacuum bagging debulk (DVD) procedures.
- to satisfy all the relevant quality assurance and safety requirements.

The course covers:

The more challenging fuselage and stringer repairs together with double vacuum bag debulking are undertaken in this course to complete the composite structural repair training required to carry out real world repairs on 787 aircraft as specified by Boeing.

Outline of the Advanced 787 Composite Structural Repairs - Practical Repair Workshop Activity

- Perform vacuum bagging procedure with leak test verification
- Perform a double vacuum bag debulk (DVD) procedure
- Perform a 787 bonded fuselage skin repair
- Perform a 787 bolted fuselage skin and stringer repair
- Perform a stress relieved titanium angle for fuselage repair

Course Title: P4-787 Advanced Composite Analysis for Engineers.

Course Code: P4-787

Duration: 5 Days

Course structure: 60% theory, 40% practical

Who is it for: The advanced extension to the base composite structural repair unit P2-787 Structural Repair - Composites is designed for graduate engineers and presents an in-depth structural composite repair analysis for engineers who are tasked to assist the Design Authority for repairs which are outside the Structural Repair Manual (SRM). This unit is carried out after P2-787 to maximise the learning outcome.

Course content

This course delivers SRM compliant training that enables the engineer to submit repairs to Boeing for the 787 that are beyond the limits of the SRM. The course focuses detailed information on material properties, stress analysis, repair strength and stiffness analysis and repair modification analysis while considering the effects of classical laminate analysis. The course also extends the engineers practical hands-on experience of bolted repairs and vacuum bagging techniques.

The course aims:

- To provide analysis skills to enable the engineer to specify repairs that are outside the 787 SRM.
- to equip the delegate with the knowledge to analyse the effects of modifying 787 SRM bolted and bonded repairs.
- to provide the delegates with the opportunity to verify repairs through stiffness analysis and use of composite design principles.
- to utilise stress analysis techniques: eg micro-mechanics and laminate plate theory.
- to equip the delegate with the knowledge to be able to identify/modify the best SRM fit for given repair.

The course covers:

The more challenging fuselage bolted skin repairs together with double vacuum bag debulking are undertaken in this course to complete the composite structural repair training. The course goes on to extend the engineers knowledge, understanding and application of analysis techniques that are used to analyse modified repairs that are outside the SRM.

Practical Repair Activity

- Double Vacuum Bag Debulk Procedure
- Fuselage Skin Bolted Repair

Composite Repair Analysis

- Repair Strength and Stiffness Analysis CLA Theory
- Bonded Repair Modification Strength and Stiffness Analysis
- Part Internal Loads
- Part Design Considerations
- Part Drawings
- Bolted Repair Strength Analysis
- Bolted Repair Fastener Load Distribution Analysis
- Bolted Repair Modification Analysis

Course Title: P5-787 Composite Repair for Quality Assurance Inspectors

Course Code: P5-787

Duration: 10 Days

Course structure: 40% theory, 60% practical

Who is it for: This quality assurance inspectors course is an important aspect of quality assurance, it is designed to equip the quality assurance inspector with the knowledge and skill to inspect and verify that repairs carried out are in compliance with the Structural Repair Manual (SRM) requirements; while also validating that the correct process has been carried out in accordance with that specified within the 787 Structural Repair Manual (SRM) thus achieving reliable and conforming repairs.

Course content

The quality assurance inspectors course is workshop based with a substantial level of hands-on repair activities to thoroughly appreciate the details of repair deployment. The central focus is upon SRM compliance and application, such techniques use the Double Vacuum Bag Debulk (DVD), Quick Composite Repair (QCR) processes, bolted and traditional composite repairs processes.

The course aims:

- to provide a knowledge of the composite repair facility, material storage requirements materials, equipment, repairs and cure applications specified in the 787 aircraft.
- to equip the delegate with the knowledge to understand bonded, bolted and complex 787 SRM composite repair processes.
- to equip the delegate with the knowledge and practical skills required to carry out effective repairs to structural composites and bonded structures for the 787 aircraft.
- to provide the delegates with the appropriate experience of vacuum bagging requirements, cure cycles and TC placement as set out in the 787 SRM.
- to equip the delegate with the knowledge to perform an inspection using the Ramp Damage Checker
- to provide the delegates with the experience to assess damage using the 787 structural repair manual (SRM)
- to satisfy all the relevant quality assurance and safety requirements.

The course covers:

Identification of material types, processes of composite monolithic bonded repair, sandwich bonded repair, experience equipment and thermocouple placement used in repair, identification of repair boundaries and material replacement orientation requirement are covered.

The course includes bonded repairs, solid laminate composite structure and bolted repairs to the 787-fuselage skin. The quality assurance inspectors carries out a comprehensive range of repair activities and inspections as illustrate below to consolidate the quality assurance inspectors knowledge through practical implementation, with the additional requirement to focus upon process control.

Outline 787 Composite Structures

- Identify the Materials, composite repair facility and material storage requirements
- Identify the Processing Materials
- Repair Tooling, Facilities, Safety, Storage - Damage inspection
- Part drawings

Application 787 SRM Processes

- Identify the principle steps in the bonded and bolted
- Locate ply boundaries and orientations
- Composite Allowable and Repairable Damage Limit Analysis Assessment
- Prepreg Composite Sandwich Repair Process
- Quick Composite Repair Process
- 787 Fuselage Skin Bonded Repair Process and identification
- DVB Debulk Process
- 787 Fuselage Skin Bolted Repair Process and identification
- Wet layup Composite Sandwich Repair Process
- Assess damage using the 787 structural repair manual (SRM)

Practical Repair Activity and Inspection

- Prepreg Cure and Facesheet Repair
- Wet Layup Core and Facesheet Repair
- Edgeband Repair
- Thermal Survey
- Quick Composite Repair
- Fuselage Skin Repair
- Double Vacuum Bag Debulk Procedure
- Fuselage Skin Bolted Repair
- Fuselage Stringer Bolted Repair with Titanium Framed Angle
- Titanium Angle Forming
- Perform an inspection using the Ramp Damage Checker

Course AC001 Title: Advanced Aircraft Composite Repair 1

Course Code: AC001

Duration: 10 Days

Course structure: 20% theory, 80% practical

Who is it for: This course is intended for those members of staff who will be carrying out repairs on composite aircraft structures. It will give them sufficient knowledge to be able to complete the repair to approved aerospace standards. No previous knowledge required, it is the prerequisite course for the 787 P-Series of courses.

Course content

The approach to composite repair and the recommendations given by manufacturers are constantly changing as more experience has been gained by the industry. The course content has been devised to respond to these changes and now reflects the current requirements for composite repair within the industry.

The repair techniques specified in the aircraft manufacturers' structural repair manuals will form the basis of the course. These techniques can be related directly to a number of aircraft types such as the Boeing 747, 757, 767, 787, Airbus A319/320/321. The theory elements support and are appropriate to enable the delegates to understand the important principles and safety requirements of composite materials and produce quality repairs.

The techniques used are those currently recommended in manufacturers structural repair manuals and emphasis is placed on the requirements to adhere to these procedures. The importance of quality assurance is stressed throughout and attention is paid to the adoption of quality control procedures and safety within the repair process. The course satisfies ATA 104 IV objectives.

The course aims to:

- familiarise the delegate with the materials and techniques used to manufacture and repair composite components.
- provide the delegate with the knowledge to satisfy the appropriate health and safety requirements.
- equip the delegate with the knowledge and practical skills required to carry out sound and effective repairs on composite aircraft components, according to the methods recommended and accepted by the aircraft manufacturers.
- provide the knowledge required to interpret standard structural repair manuals and to relate them to a given repair situation.
- familiarise the delegate with a wide range of structural repair methods so they can find all the relevant information relating to a particular repair.

The course covers:

Delegates will be introduced to composites, the fibres and resins used in their structure, their properties, behaviours and the reasons for their use in aircraft components. The importance of correct resin/fibre/hardener ratios and the requirement for good health and safety practices are emphasised. Delegates prepare a reinforced composite 'patch or doubler' by hand lay-up to familiarise them with the materials and correct procedures in the handling of composites together with the importance correct volume fraction and layer orientation.

The techniques of vacuum bagging and various heat curing methods used for advanced composite repair on aircraft structures are introduced and the delegates produce vacuum bags and heat cured monolithic structures.

The delegates produce laminates with different orientations to use in an exercise to explore the impact of fibre orientation. The impact of surface preparation the importance of following the correct procedures is demonstrated during the manufacture of the vacuum bags and laminates. Correct and incorrect procedures for surface preparation will be demonstrated, continual use of good practice is emphasised throughout the course.

The advantages, reasons for use and special characteristics of honeycomb cores and their use within aircraft structures is demonstrated. The techniques of bonding, cutting, machining and orientation are demonstrated and practiced with Monolithic and Nomex cored composite panels extensively in flat, curved and complex curved components.

The delegates are introduced to the different types of damage and repair that can occur in operation. Various manufactured panels are damaged and repaired in accordance with the appropriate structural repair methods by the delegates. This includes methods of cutting cores and laminates, with details of the tools to use, recommended cutting speeds and handling.

Repair methods used in cellular systems including skins, core damage, core removal and filling, through damage and consequence of poor repair with rectification procedures to form a foundation for real world application commencing and accumulating in a formal assessment activity utilising aircraft components.

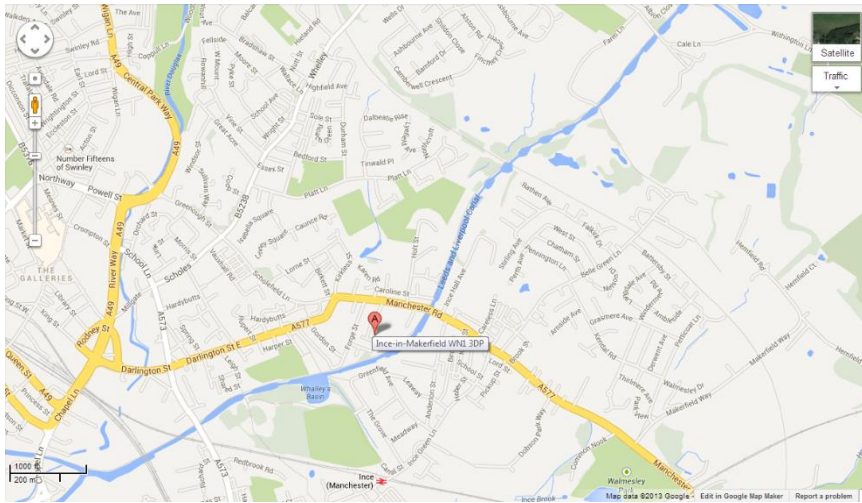
Manufacturers SRM's are used throughout the course with a clear bias towards repair implementation methodology to address the increasing repair demands of the cellular and monolithic systems

Methods of damage assessment and guidance in choosing the most appropriate method of repair for a multi stage repair are explored, including the choice between wet lay-up and pre-preg repair. Full puncture damage repair to panels will be carried out using pre-preg materials along with recommended methods of moisture removal and finishing.



Location and contact details

We are located within 1 mile of Wigan town centre and 22 miles from central Manchester.



By Car

We are located close to the main M6 motorway for north and south bound carriageways. From Manchester we are off the M61 at junction 5. Follow signs for Wigan when leaving the motorways.

North Composites Engineering Ltd
Unit 8 Rosebridge Court
Rosebridge Way
Ince
Wigan

Sat Nav location

WN1 3DP

Rail Link

We are easily accessed by rail link with Wigan North Western and Wigan Wallgate stations are only 1.8 miles away and Ince rail station is 0.7 of a mile away all have links to Manchester Piccadilly Station.

Contact Details

For further details of our other courses and service or to reserve a place please contact us on:

Phone: +44(0)1942 665292

Email: info@aeroskills.co.uk



Hotels and accommodation close to North Composites Engineering.

Wigan Oak Hotel (Mercury Hotel)

Orchard Street

WIGAN

WN1 3SS

Contacts

Tel : (+44)1942 826888

Fax : (+44)1942825800

E-Mail : H8200@accor.com

3 star hotel located close to the centre of Wigan, approx. 0.8 mile from NCE.

Premier Inn Wigan Town Centre

Harrogate Street,

Wigan, WN1 1BL

Contacts

T: 0871 527 9502

F: 0871 527 9503

Part of the premier inn group, approx. 2.4 miles to NCE

Premier Inn Wigan

Warrington Road,

Marus Bridge,

Wigan,

WN3 6XB

Contacts

Tel: 0871 527 9164

Fax: 0871 527 9165

Part of the premier inn group, approx. 3.1 miles to NCE.

<http://www.premierinn.com>

Macdonald Kilhey Court

Chorley Road,

Standish

Wigan

WN1 2XN

Contacts

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4 star hotel located just outside Wigan, approx. 6.7 miles to NCE

<http://www.macdonaldhotels.co.uk/our-hotels/macdonald-kilhey-court/>