



**dark matter composites ltd**

## *Composite Course Schedule 2025*

We provide the most comprehensive range of composite training courses available. Delegates regularly attend our courses from all industry sectors worldwide which are suitable for individuals and small companies through to tier one suppliers and OEMs.

We are continually involved in training industry personnel for the next generation of composite parts. Our courses are recognised as demanding, rewarding and representative of current best practice and processes and are continually updated. Our tutors are industry experts and our facilities set the standards for best practice and are specifically designed for delivery of composite training courses.

<b>Course Code</b>	<b>Title</b>	<b>Price per Delegate (incl. 20% UK VAT)</b>	<b>Course Dates</b>
DMSC50	Introduction to Composite Materials & Processes	£2,100.00	<b>1-5 September 2025</b>
DMSC51	Wet Lay-Up Laminating	£2,100.00	28 Apr – 2 May 2025
DMSC52	Spray Lay-Up Laminating	£2,100.00	<i>please call/email us for further details</i>
DMSC53	Resin Infusion Laminating & Light RTM	£2,100.00	24-28 Feb 2025 <b>8-12 September 2025</b>
DMSC54	Pre-Preg Laminating – Stage 1	£2,100.00	24-28 Mar 2025 10-14 Nov 2025
DMSC55	Pre-Preg Laminating – Stage 2	£2,100.00	17-21 Nov 2025
DMSC56	Pre-Preg Mould Making	£2,520.00	31 Mar - 4 Apr 2025
DMSC57	Trimming, Finishing & Assembly of Composites	£2,520.00	30 Jun – 4 Jul 2025
DMSC58	Composite Repair – Stage 1	£2,520.00	10-14 Mar 2025 <b>29 Sep - 3 Oct 2025</b>
DMSC59	Composite Repair – Stage 2	£2,520.00	<b>6-10 Oct 2025</b>
DMSC60	Producing Your Own Composite Parts	£2,100.00	12-16 May 2025
DMSC61	Composites for Engineers & Designers Stage 1 - Materials & Processes	£2,100.00	20-24 Jan 2025 9-13 Jun 2025 22-26 Sep 2025
<b>DMSC62</b>	<b>Composites for Engineers &amp; Designers Stage 2 – Next Steps</b>	<b>£2,100.00</b>	<b>16-20 Jun 2025</b>

### **Bespoke Training Courses**

If you cannot find a course to suit your needs, bespoke courses can also be provided for individuals through to full company training programmes, worldwide at the customers' own facilities or at our premises. Pricing is dependent on location, delegates and course content. Please contact us to discuss your needs.



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## *Composite Course Information*

### **Bespoke Training Courses**

If you cannot find a course to suit your needs, bespoke courses can also be provided for individuals through to full company training programmes, worldwide at the customers' own facilities or at our premises. Pricing is dependent on location, delegates and course content. Please contact us to discuss your needs.

### **Entry Requirements**

No qualifications or previous experience is required unless otherwise stated on the specific course information sheet. If you are unsure please contact us.

### **Enrolments**

- Enrolments are taken on a first come, first served basis. We require either an on-line booking or a completed enrolment form and full payment.
- On receipt of your booking/enrolment form, we will process your payment if there are places available on the course and issue a full course confirmation.
- If the course is full, your payment will not be processed and you will be advised accordingly.
- Please note that we do not take provisional bookings or hold any places. Course confirmations are only sent if places are available and full payment has been received into our account.

### **Payment**

We accept the following forms of payment and can provide companies with pro-forma invoices where required:

- Credit and Debit cards including Mastercard, Visa, Maestro, Solo and American Express
- Personal or Company cheques payable to 'Dark Matter Composites Ltd'
- Paypal
- BACS, CHAPS or IBAN bank transfers

### **Course Fees**

- The fees are stated on the individual course information sheets and are per delegate per course.
- Course fees stated are in pounds sterling and are subject to UK VAT at the current rate (20%).
- EU companies may be able to reclaim UK VAT through their local VAT system.
- Non-EU delegates cannot reclaim the VAT as the course is a service provided in the UK and not an exported product.
- The fees stated are valid until 31<sup>st</sup> December 2025.
- All fees stated include: provision of all materials, tools, equipment and protective clothing (except footwear, see below); lunch, tea & coffee for each day of the course; and course handouts.
- All course fees must be paid prior to the start of the course.
- Items produced by delegates can be taken away at the end of the course.

### **Location**

Our courses are run at our dedicated training facilities in Redbourn, Hertfordshire, United Kingdom. We are close to London with good travel links to Central London and all London Airports, with London Luton Airport just 8 miles away. There are good transport links to the M1/M25 motorways and train links at the local towns of Hemel Hempstead, St Albans, Harpenden and Luton.

### **Times & Attendance**

Each day starts promptly at 9am and finishes at approximately 6pm, Monday to Friday.

### **Clothing, tools and equipment**

- Delegates must wear full-length trousers and closed leather shoes or safety boots (no fabric, perforated or open footwear) during the course.
- All other tools, equipment and personal protective equipment are included in the course fee.

### **Course Assessment**

Assessment activities are built into our courses, to give feedback on the achievement and potential of delegates. Delegates are assessed on their attendance, quality of practical work completed and a written test. Assessment marks are printed on the course certificates and kept on record.

### **Exclusions**

Travel, accommodation and general sustenance expenses incurred by delegates are excluded from the course prices (except where otherwise stated).

### **Accommodation**

Please note that we have an accommodation list that is available on our website or upon request.

t/f +44 (0)1582 791001 [www.darkmattercomposites.com](http://www.darkmattercomposites.com)

Unit 8 Redbourn Industrial Estate, High Street, Redbourn, Hertfordshire, AL3 7LG, UK

Registered in England & Wales No: 5395870

Issued 04/2025



## dark matter composites ltd

**Course Title:** Introduction to Composite Materials & Processes

**Course Code:** DMSC50

**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)

**Structure:** 30% theory, 70% practical, 10 delegates maximum, no experience required

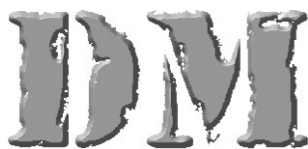
### Summary

This course provides a good overview of composites in terms of materials, processes, typical applications, advantages/disadvantages and limitations.

The course is suitable for support staff who need an awareness of composites and understanding of terminology used, typically quality, sales, purchasing, HR and administration roles as well as 1<sup>st</sup> year apprentices.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u> <u>Equipment issue</u> <u>Health &amp; Safety</u> <u>Theory</u> Composites history Composites theory	<u>Theory</u> Matrix materials Reinforcing materials Fabric types Laminate theory Process overview	<u>Theory</u> Wet lay-up laminating overview & simple resin calculations  <u>Demo &amp; Practical</u> Wet lay-up laminating of a mould including material preparation and dispensing, gel coating, wetting out & consolidation using brush application	
Tuesday	<u>Practical</u> Completion of wet lay-up mould lamination using roller application	<u>Theory</u> Pre-preg laminating overview  <u>Theory, Demo &amp; Practical</u> Pre-preg templating & material preparation	<u>Demo &amp; Practical</u> Laminate first skins of the pre-preg part Vacuum de-bulk	<u>Theory</u> Sandwich panel theory Core materials  <u>Demo &amp; Practical</u> Prepare core for pre-preg part
Wednesday	<u>Practical</u> Laminate core & closing skins of pre-preg part	<u>Theory</u> Vacuum bagging materials & methods  <u>Demo &amp; Practical</u> Vacuum bagging of pre-preg part	<u>Theory &amp; Practical</u> Matrix curing & post-curing Cure pre-preg part  <u>Theory &amp; Demos</u> Trimming, finishing & inspection of composites	<u>Demo &amp; Practical</u> Breakout wet lay-up mould tool Trim & finish mould ready for use Post-cure mould
Thursday	<u>Theory</u> Tooling care & preparation Release & adhesion Release agent types  <u>Demo &amp; Practical</u> Release GRP mould for use	<u>Theory</u> Resin infusion laminating overview  <u>Demo &amp; Practical</u> Laminate resin infusion part using a range of materials and methods	<u>Demo &amp; Practical</u> Vacuum bagging of infusion parts Final infusion and curing of resin infusion parts	<u>Theory, Videos &amp; Discussion</u> Resin transfer moulding Hot press moulding Filament winding Pultrusion Automated tape laying & fibre placement
Friday	<u>Practical</u> Breakout, trim & finish resin infusion and pre-preg composite parts		<u>Practical &amp; Discussion</u> Inspection of parts & identifying defects  <u>Written test</u> (30 minutes)	<u>Equipment return</u>  <u>Reinstate Workshop</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

**Course Title: Wet Lay-Up Laminating**

**Course Code: DMSC51**

**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)

**Structure:** 30% theory, 70% practical, 8 delegates maximum, no experience required

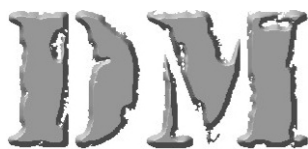
### Summary

Wet lay-up is the most widely used laminating process. We use a structured approach to train delegates to produce quality parts consistently. Using controlled processing, delegates reduce wastage and generated fumes to comply with new emissions laws. Working with a large range of materials, tools and laminating techniques, delegates will gain a level of practical competence during the course.

This course is suitable for the full training of wet lay-up laminators, as well as engineers who need a complete understanding of the process and design aspects of this laminating technique.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, matrix, reinforcing & fabric materials	<u>Theory &amp; Demo</u> Wet lay-up processing  Exotherm and controlling risk  Controlling styrene emissions  Lay-up specifications	<u>Theory, Demo &amp; Practical</u>  Tooling care, preparation & release agents  <u>Demo &amp; Practical</u> Gel coat calculations, dispensing & preparation  Polyester gel coat application	<u>Demo &amp; Practical</u> Laminate convex shapes with a range of reinforcements, fabrics & polyester resins  Brush & small roller application methods
Tuesday	<u>Demo &amp; Practical</u> Laminate concave shapes with a range of reinforcements, fabrics & polyester resins  Combined brush & small roller application methods	<u>Theory &amp; Demo</u> Storing, handling & templating of fabrics Ply orientation, nesting & kitting  <u>Practical</u> Preparation of a range of fabrics to part specification	<u>Theory &amp; Demo</u> Storage, handling & safe dispensing of gel coats, pigments, accelerators & catalysts  <u>Practical</u> Preparation & application of epoxy gelcoats	<u>Practical</u> Laminating of internal, external, acute & radius corners, feathered, butt & overlap joints, vertical & horizontal surfaces with a range of reinforcements, fabrics & epoxy resins
Wednesday	<u>Practical</u> Laminating of internal, external, acute & radius corners, feathered, butt & overlap joints, vertical & horizontal surfaces with a range of reinforcements, fabrics & epoxy resins	<u>Theory &amp; Demo</u> Preparation of multi part tooling  <u>Practical</u> Prepare loose tooling, nett edges and joggle tooling	<u>Theory &amp; Demo</u> Continuous laminating over large areas, sequence planning & use of peel plies  <u>Practical</u> Continuous laminating of a large part in groups with nett edges, joggle details, vertical & horizontal surfaces, peel plies & green trimming	
Thursday	<u>Theory &amp; Demo</u> Sandwich structures Core materials Bonding, joining, inserts & hardpads Flowcoats	<u>Practical</u> Preparation & lamination of core materials and closing plies  Preparation & fitting of inserts and ancillaries using bonding paste	<u>Theory &amp; Discussion</u> De-bag & de-mould parts  Process control & inspection Causes of & identifying defects	<u>Assessed Practical</u> Planning of operations Preparation of complex tool & materials, including nett edges, return edges, split lines, cores, inserts, hard pads & vertical surfaces
Friday	<u>Assessment of Competency</u> Laminate a complex assessment part start to finish including gel coating, laminating plies, inserts and core materials			<u>Written test</u>  <u>Equipment return</u>  <u>Reinstate Workshop</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

**Course Title:** Spray Lay-Up Laminating

**Course Code:** DMSC52

**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)

**Structure:** 25% theory, 75% practical, 8 delegates maximum, no experience required

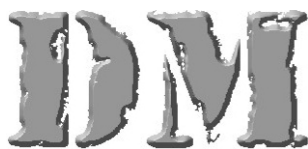
### Summary

Spray lay-up is a process that is suited to medium to large mouldings. It is a relatively simple process that is highly dependent on operator skill in setting up and using the specialised spray equipment, in the proper manner, to obtain consistent results.

This course is suitable for the training of spray lay up laminators, as well as engineers who need a complete understanding of the process and design aspects of this laminating technique.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u> <u>Equipment issue</u> <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, matrix, reinforcing & fabric materials	<u>Theory</u> Wet lay-up & spray lay-up processes Lay-up specifications  <u>Theory, Demo &amp; Practical</u> Tooling care, preparation & release agents	<u>Theory, Demo &amp; Practical</u> Set up, use and cleaning of gel coat gun Controlling styrene emissions Spray patterns & gun/body articulation Polyester gel coat application to concave & convex shapes, controlling & checking coating thickness	
Tuesday	<u>Theory &amp; Demo</u> Storing, handling & preparation of gel coats, pigments, accelerators & catalysts Exotherm and controlling risk  <u>Theory, Demo &amp; Practical</u> Set up, use and cleaning of chopper gun Developing spray patterns, correlating resin/fibre delivery, roving entry and distribution into the resin stream		<u>Demo &amp; Practical</u> Spray lay-up of concave & convex shapes, application & brush/roller consolidating using polyester resins Spray patterns, overlaps, gun & body articulation Controlling & checking coating thickness	
Wednesday	<u>Theory, Demo &amp; Practical</u> Use and fitting of masks and containment flanges	<u>Demo &amp; Practical</u> Brush application of gel coats & tissue plies	<u>Demo &amp; Practical</u> Preparation & spray lay-up of male tool, including external, acute & radius corners, horizontal, vertical & angular surfaces and green trimming using epoxy resins	
Thursday	<u>Theory &amp; Demo</u> Preparation of multi part tooling  <u>Practical</u> Prepare loose tooling, nett edges, return edges & split moulds	<u>Theory &amp; Demo</u> Sandwich structures Core materials  <u>Practical</u> Preparation of core materials Laminate preparation	<u>Demo &amp; Practical</u> Preparation & spray lay-up of detailed female tool, including internal, acute & radius corners, angular surfaces, return & nett edges Fitting & over laminating of core materials	
Friday	<u>Theory, Demo &amp; Practical</u> Bonding and joining techniques Fitting inserts and ancillaries	<u>Demo &amp; Practical</u> De-mould & comparison of parts  Safe edge parts produced	<u>Theory &amp; Discussion</u> Causes of & identifying defects Final inspection of parts produced	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

**Course Title:** Resin Infusion Laminating & Light RTM

**Course Code:** DMSC53

**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)

**Structure:** 35% theory, 65% practical, 12 delegates maximum, no experience required

### Summary

Resin infusion laminating and light resin transfer moulding are covered in a single course due to the similar nature of the processes yet distinctive merits. This course covers a full range of materials and processing techniques, giving an in-depth and hands on approach to understanding how the processes work and how they can be applied successfully.

This course is suitable for lead technicians, supervisors, engineers, designers and researchers who are responsible for trials, development and tooling design associated with these processes.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u> <u>Equipment issue</u> <u>Health &amp; Safety</u> <u>Theory</u> Introduction to composites theory, matrix, reinforcing & fabric materials	<u>Theory &amp; Discussion</u> Resin flow infusion Darcy's Law and effects of permeability, flow channels, pressure dams, vacuum, temperature & viscosity External distribution & infusion media & flow fronts	<u>Theory, Demo &amp; Practical</u> Setting up & completing trial panels Resin calculations Vacuum bagging Vacuum bag materials & methods Leak detection & vacuum volume	<u>Demo &amp; Practical</u> Resin flow infusion trial panels using a range of laminate combinations, core materials, external distribution & infusion media  <u>Theory &amp; Discussion</u> Sandwich panels Infusion core materials
Tuesday	<u>Practical</u> Infuse sandwich trial panels  <u>Theory &amp; Practical</u> Using trial panel information Designing infusion layout for parts	<u>Theory, Demo &amp; Practical</u> Tooling care, preparation & release agents  <u>Practical</u> Lay-up a resin flow infusion part into a complex female tool including gel coat application, fabrics, core material, external distribution & infusion media, surface bagging & leak checking		<u>Discussion &amp; Practical</u> Resin calculations for parts Predicting flow fronts & infusion times Final resin flow infusions of parts with external media
Wednesday	<u>Theory</u> Internal infusion media and light resin transfer moulding (Light RTM) Reinforcing fabrics & core materials	<u>Practical</u> Resin flow infusions with a range of internal media, reusable silicon vacuum bags & semi-rigid closed moulds	<u>Theory</u> Reusable silicon vacuum bags Semi-rigid closed moulds Creating seals, connections and resin channels	<u>Theory, Demo &amp; Practical</u> Design of mould seals, injection & vent points Application of calibration wax, injection & vent point connections & profiles
Thursday	<u>Theory, Demo &amp; Practical</u> Resin film infusion Material life, storing, defrosting, handling, templating & application	<u>Practical</u> Use resin film laminating to produce a semi-rigid closed mould to be used for producing light RTM parts		<u>Demos &amp; Practical</u> Envelope vacuum bagging  <u>Theory &amp; Practical</u> Curing resin films Temperature profiles
Friday	<u>Demo &amp; Practical</u> Break out and prepare semi-rigid closed moulds for use	<u>Guided Practical</u> Apply gel coat and apply reinforcement materials Prepare & use Light RTM equipment to produce parts	<u>Practical</u> Break out parts  <u>Theory &amp; Discussion</u> Infusion causes of & identifying defects & relate to parts produced	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



**dark matter composites ltd**

**Course Title: Pre-Preg Laminating – Stage 1**

**Course Code: DMSC54**

**Course Fees: £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)**

**Structure: 35% theory, 65% practical, 10 delegates maximum, no experience required**

**Summary**

This course follows the complex production processes associated with using pre-preg materials, by breaking them down into simple progressive steps. It covers a wide range of materials, processing methods and application techniques applied solely to pre-preg laminates. This is considered the foundation course for a number of high end industry sectors using these materials, including Formula 1 and OEM/Tier 1 Aerospace.

This course is suitable for anyone involved with processing pre-preg materials, including pre-preg laminators, technicians, supervisors, engineers, designers, researchers and managers.

**Course Content**

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, matrix, reinforcing & fabric materials	<u>Theory</u> Pre-preg materials Pre-preg processing Lay-up specifications  <u>Theory, Demo &amp; Practical</u> Tooling care & preparation Release agents	<u>Practical</u> Prepare tooling Laminate convex shapes using draping methods with a range of reinforcements and fabrics	<u>Theory, Demo &amp; Practical</u> Vacuum bagging Vacuum bagging materials Application methods & leak detection Surface bagging Oven cure part
Tuesday	<u>Theory, Demo &amp; Practical</u> Material life, storing & defrosting Laminate features & datums Material templating	<u>Theory, Demo &amp; Practical</u> Clean rooms Ply orientation Standard orientation notations & variations Nesting & kitting	<u>Theory &amp; Demo</u> Material application & consolidation  <u>Practical</u> Laminating internal, external corners, acute & radius corners, butt & overlap joints, ply dropping, using placement & draping methods	
Wednesday	<u>Demo &amp; Practical</u> Fully templated envelope bagging of part Autoclave cure part	<u>Theory, Demo &amp; Practical</u> Pre-preg curing Temperature & pressure profiles Exotherm, post curing & Tg points Ply Correction & Reversing	<u>Theory &amp; Demo</u> Vacuum de-bulks  <u>Practical</u> Preparation & laminating of a female tool incorporating loose, joggle & nett details	<u>Theory &amp; Demo</u> Hard pads & inserts  <u>Practical</u> Laminating of a female tool incorporating, loose, nett edge, return & joggle detail, hard pads & inserts
Thursday	<u>Practical</u> Envelope bagging & autoclave cure part  <u>Theory, Demo &amp; Practical</u> De-moulding parts	<u>Theory &amp; Discussion</u> Process control & inspection Causes of & identifying defects	<u>Assessed Practical</u> Laminate assessment part start to finish including tooling preparation, material preparation, templating, split tooling, de-bulking	
Friday	<u>Assessed Practical</u> Completion of assessed practical Through aperture envelope bagging & autoclave curing of part		<u>Theory &amp; Video</u> Automated tape laying and fibre placement  <u>Practical</u> Safe edge all parts produced	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

**Course Title:** Pre-Preg Laminating – Stage 2

**Course Code:** DMSC55

**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)

**Structure:** 25% theory, 75% practical, 10 delegates maximum

**Pre-requisite:** Prior completion of course DMSC54, Pre-preg Laminating – Stage 1

### Summary

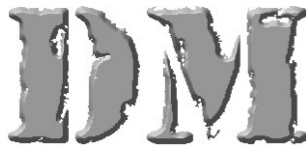
This is a progression course and follows the full range of single and multi-stage techniques associated with using a range of core materials to produce sandwich structures with pre-preg materials.

This course is suitable for anyone involved with processing pre-preg materials, including pre-preg laminators, technicians, supervisors, engineers, designers, researchers and managers.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Theory &amp; Demos</u> Refresh of composite theory & materials Sandwich panel theory Core materials	<u>Theory</u> Adhesive Bonding Peel plies Two/double stage processing  <u>Practical</u> Laminate first skin, for 2 stage lay-up including peel ply, vacuum bagging & curing	<u>Theory &amp; Demo</u> One/single stage processing  Preparation of nomex & aluminium honeycomb core materials  Resin film application Core splicing	<u>Practical</u> Laminate one/single stage core lay-up on curved tool, including honeycomb materials, de-bulking, core splicing, vacuum bagging & curing
Tuesday	<u>Theory, Demo &amp; Practical</u> Processing foam and syntactic core materials Thermoforming foam  <u>Demo &amp; Practical</u> De-bag & preparation of first skin	<u>Practical</u> Preparation and fitment of honeycomb, foam, syntactic core and core splicing over internal, external, acute & radius corners	<u>Theory &amp; Demo</u> Caul plates with core processing  <u>Practical</u> Processing hard pads & inserts into sandwich panels	<u>Practical</u> Laminating of closing skins for two/double stage lay-up  Vacuum bag & cure
Wednesday	<u>Theory</u> Three/triple stage processing  <u>Practical</u> Laminate, vacuum bag & cure outer skin for three/triple stage lay-up	<u>Theory &amp; Demo</u> Inserts, hard pads with core processing  <u>Practical</u> Laminate, vacuum bag & cure inner skin for three/triple stage lay-up	<u>Practical</u> Prepare outer & inner skins, laminate resin film, fit & splice core, fit and pot inserts for a closed mould three/triple stage lay-up  Vacuum bag and autoclave cure for closed mould three/triple stage lay-up	
Thursday	<u>Demo &amp; Practical</u> De-bag & de-mould all parts produced  <u>Theory &amp; Discussion</u> Process control & inspection	<u>Theory &amp; Discussion</u> Causes of & identifying defects  Inspection of parts produced	<u>Assessed Practical</u> Laminate complete part including material preparation, multi-stage laminating and processing, split tooling, inserts, various core materials & vacuum de-bulking	
Friday	<u>Assessed Practical</u> Complete assessed practical, vacuum bagging, autoclave loading & curing		<u>Practical</u> De-bag & de-mould assessment part  Safe edge all parts produced	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>





**dark matter composites ltd**

**Course Title: Pre-Preg Mould Making**

**Course Code: DMSC56**

**Course Fees: £2,100.00 course fee plus £420.00 UK VAT (£2,520.00 per delegate)**

**Structure: 30% theory, 70% practical, 8 delegates maximum, no experience required**

**Summary**

The course provides comprehensive training, understanding and application of low temperature pre-preg materials to produce composite tooling. Emphasis is on producing mould tools with complex geometry that are self supporting with no distortion.

This course is suitable for anyone involved with processing pre-preg moulds, including pre-preg laminators, technicians, supervisors, engineers & designers.

**Course Content**

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
<b>Monday</b>	<u>Introduction</u> <u>Equipment issue</u>  <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, matrix, reinforcing & fabric materials	<u>Theory</u> Pre-preg materials Pre-preg processing  <u>Theory</u> Tooling and component design principles Pattern & mould materials Thermal expansion Spring back & distortion	<u>Theory, Demo &amp; Practical</u> Release agents Release pattern Pattern checking & Preparation of a two part pattern  <u>Demo</u> Fitting pattern split/joint boards, shaped locators and bush locating dowels	<u>Theory, Demo &amp; Practical</u> Production of pre-preg moulds using the tile method  Handling, preparation & application of low temperature pre-preg Lay-up first ply of first part of a two part tool using tiled materials
<b>Tuesday</b>	<u>Theory</u> Vacuum bagging Materials & application methods Leak detection Vacuum de-bulking  <u>Demo &amp; Practical</u> De-bulk first ply of single part tool	<u>Practical</u> Complete lay-up of first part of a two part tool including orientated & tiled plies, double curvature, internal corners, draping, vacuum de-bulks and balancing final ply Final De-bulk		<u>Theory, Demo &amp; Practical</u> Low temperature pre-preg curing Temperature & pressure profiles Vacuum bagging for autoclave curing Cure first stage of two part tool
<b>Wednesday</b>	<u>Demo &amp; Practical</u> Remove split board and prepare pattern for second stage of two part tool	<u>Theory &amp; Demos</u> Templated, balanced, orientated plies & ply joins for tooling  <u>Practical</u> Template & nest plies for second mould half	<u>Demo &amp; Practical</u> Production of second part of a two part pre-preg mould, including application of templated, orientated and balanced plies, fitting drill/bolting bushes, vacuum de-bulks & cure vacuum bag	
<b>Thursday</b>	<u>Theory, Demo &amp; Practical</u> De-bag & break out split mould tools Cleaning & assembly of mould tools	<u>Theory, Demo &amp; Practical</u> Post-curing of moulds Tg points  <u>Theory &amp; Discussion</u> Alternative Pre-preg tooling systems	<u>Demo &amp; Practical</u> Lay-up single part tool using alternative pre-preg tooling systems, bushes, dowels, stiffening flanges, vacuum bagging & autoclave curing	
<b>Friday</b>	<u>Theory, Demo &amp; Practical</u> Safe edging, flash removal and surface finishing of moulds Sealing & release moulds produced	<u>Theory, Demo &amp; Practical</u> Tooling modifications Mould stiffening Loose tooling Return & nett edge tooling	<u>Practical &amp; Discussion</u> Case studies for tooling and component design	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



**dark matter composites ltd**

**Course Title:** Trimming, Finishing & Assembly of Composites

**Course Code:** DMSC57

**Course Fees:** £2,100.00 course fee plus £420.00 UK VAT (£2,520.00 per delegate)

**Structure:** 30% theory, 70% practical, 8 delegates maximum, no experience required

**Summary**

This course provides comprehensive training, understanding and application of a full range of trimming, finishing and assembly techniques associated with composite parts. Emphasis is on the safe and effective use of a range of hand, power and bench tools applied to composite materials. As there are no speeds or feeds tables for composite materials, the course includes selection and use of the right abrasive or cutting head for the right materials to give the best results.

This course is suitable for anyone involved with trimming, finishing and assembly of composite parts, including technicians, supervisors, CNC operators, engineers, designers, researchers and managers.

**Course Content**

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, materials & processes	<u>Theory</u> Types, uses & control of engineering sketches & drawings  <u>Practical</u> Interpreting & extracting information from engineering sketches & drawings	<u>Theory &amp; Demos</u> Identifying materials and processes used for composite parts Safe handling of unfinished parts  <u>Theory &amp; Demos</u> Measuring & marking out composite parts	<u>Practical</u> Measure & mark a range of features on a range of composite parts/materials using surface tables, height gauges, scribes, rules & jigs
Tuesday	<u>Theory &amp; Demo</u> Trimming, sanding & finishing overview Cutting & abrasive materials & grades Planning operation sequences	<u>Theory &amp; Demo</u> Safe use of air and electrical power tools Dust generation, control & extraction Defects caused by trimming activities	<u>Theory &amp; Demos</u> Edge damage and de-lamination Setting up & safe use of band saws, disc cutters, routers and saws  <u>Practical</u> Cut a range of profiles in a range of composite parts/materials using a range of tools and jigs	
Wednesday	<u>Theory &amp; Demos</u> Filing & sanding composite materials Edge & surface finishing Setting up & safe use of finishers, disc sanders, die grinders, belt sanders & orbital sanders  <u>Practical</u> Final shaping and surface finishing of a range of features in a range of composite materials using range of tools and jigs		<u>Theory &amp; Demos</u> Drilling & boring composite materials Break through, laminate support and back drilling Setting up & safe use of pedestal drills, low speed and high speed hand drills  <u>Practical</u> Drill & bore a range of hole features in a range of composite parts/materials including small/large holes, counter sinks, counter bores, inserts, carbide & diamond tips & drill jigs	
Thursday	<u>Theory, Demos &amp; Practical</u> Cleaning & polishing composite materials using compounds, abrasives & polishers	<u>Theory, Demos &amp; Practical</u> Composite assemblies Adhesive bonding Surface preparation Peel plies Adhesive application & curing		<u>Discussion &amp; Practical</u> Inspection, evaluation and review of all activities completed  Assessment briefing
Friday	<u>Assessed Practical</u> Fully trim, drill, finish and assemble a range of test components accurately to drawings  Including planning operations, selection of correct tools, cutting heads & abrasives, effective techniques & final assembly of the parts			<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

**Course Title: Composite Repair – Stage 1**

**Course Code: DMSC58**

**Course Fees:** £2,100.00 course fee plus £420.00 UK VAT (£2,520.00 per delegate)

**Structure:** 30% theory, 70% practical, 10 delegates maximum, no experience required

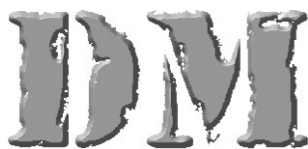
### Summary

This course provides comprehensive training, understanding and hands on application of a full range of repair techniques to composite mouldings, from cosmetic through to structural repairs. Emphasis is on understanding failure modes, recognising materials and production process, and correct use of tools, abrasives and dust extraction in order to apply effective repairs.

This course is suitable for anyone involved with repairs to composite materials, including repair technicians, supervisors, engineers, designers, researchers and managers.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Health &amp; Safety</u>  <u>Theory</u> Introduction to composites theory, materials & processes	<u>Theory &amp; Discussion</u> Damage detection Repair of composites overview  <u>Theory, Discussion &amp; Demo</u> Dust generation, risk assessment & capture	<u>Theory &amp; Discussion</u> Material removal tools & abrasives  <u>Theory, Demo &amp; Practical</u> Non-structural cosmetic & temporary repairs	<u>Theory, Demo &amp; Practical</u> Wet lay-up laminating Matrix preparation, application, curing & exotherm control Application of cosmetic gel coat repairs Application of temporary repairs
Tuesday	<u>Demo &amp; Practical</u> Sanding and polishing of cosmetic gel coat repairs Re-filling of cosmetic gel coat repairs Assessment of temporary repairs	<u>Theory, Practical &amp; Discussion</u> Failures modes & predicting failure Impacts & assessment of damage  <u>Theory</u> Minor and major structural laminate repairs	<u>Demo &amp; Practical</u> Removal of temporary repair Preparation of tapered/scarf surfaces Preparation of single & double sided repair surfaces	<u>Theory, Demo &amp; Practical</u> Temporary backing structures Process & material matching & preparation
Wednesday	<u>Theory, Demo &amp; Practical</u> Wet lay-up laminating of single & double sided, minor & major structural repairs	<u>Theory &amp; Demo</u> Structural sandwich panel repairs Core preparation & splicing  <u>Practical</u> Preparation of type A, B & C structural sandwich panel repair surfaces & materials for infused & pre-preg panels		<u>Theory &amp; Demo</u> Vacuum bagging & materials Caul plates  <u>Demo &amp; Practical</u> Wet lay-up & vacuum bagging of type A/B structural repairs
Thursday	<u>Demo &amp; Practical</u> Recognition & orientation of pre-preg materials Laminating of type B/C structural pre-preg sandwich panel repairs	<u>Theory &amp; Practical</u> Curing pre-preg repairs Temperature & pressure profiles Tg points Use of hot bonder for curing pre-preg repairs	<u>Discussion &amp; Practical</u> Inspection, evaluation and review of repairs completed Destructive testing of repairs	<u>Assessed Practical</u> Assessment of damage Complete a repair strategy Preparation of repairs
Friday	<u>Assessed Practical</u> Completion of repairs to a range of test piece components, including step sanded surface preparation, identification of laminate plies, preparation & application of orientated materials, vacuum bagging, curing, surface finishing, blending and polishing			<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



## dark matter composites ltd

<b>Course Title:</b>	<b>Composite Repair – Stage 2</b>
<b>Course Code:</b>	<b>DMSC59</b>
<b>Course Fees:</b>	£2,100.00 course fee plus £420.00 UK VAT (£2,520.00 per delegate)
<b>Structure:</b>	25% theory, 75% practical, 8 delegates maximum
<b>Pre-requisite:</b>	Prior completion of course DMSC58 (previously DMSC59, Repair of Composites)

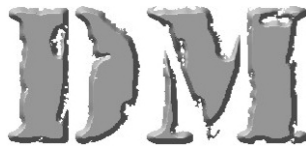
### Summary

This progression course addresses more advanced composite repair techniques and issues in respect to more extensive and complex structural repairs. Repairs are conducted on solid laminates and sandwich panels using temporary repair tooling, step sanding routers and jigs, standard repair patches and more extensive range of curing methods. Emphasis is on refinement of the repair techniques and working with on-tool dust extraction.

This course is suitable for anyone involved with repairs to composite materials, including repair technicians, supervisors, engineers, designers, researchers and managers.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
<b>Monday</b>	<u>Introduction</u>  <u>Equipment issue</u>  <u>Theory &amp; Discussion</u> Advanced composite repairs Co-bonding & secondary bonding structural repairs Structural repair design and processes	<u>Theory, Demo &amp; Practical</u> Refresh of composite materials & processes On tool extraction, dust containment and capture strategies Advanced dust control & dust free material removal	<u>Theory, Demo &amp; Practical</u> Pre-preg material life, storing & defrosting Ply orientation standards, notations & variations Spring back, distortion, balanced & un-balanced orientated plies Nesting & kitting	<u>Theory, Demo &amp; Practical</u> Adhesion & release Release agents Adhesive Bonding Peel plies  <u>Demo &amp; Practical</u> Production of a pre-preg panel to production documentation
<b>Tuesday</b>	<u>Theory, Demo &amp; Practical</u> Sandwich panels & multistage processing Core materials & tracer films Preparation & application of honeycomb core Second stage curing of pre-preg panel	<u>Theory &amp; Discussion</u> Human Factors Damage inspection & evaluation Damage reporting Structural repair design considerations	<u>Theory, Demo &amp; Practical</u> NDT inspection overview & techniques Setting up and using NDT equipment NDT inspection of undamaged parts	<u>Practical</u> NDT Inspection of damaged parts Production of inspection report Design of a standard step sanded repair scheme
<b>Wednesday</b>	<u>Theory, Demo &amp; Practical</u> Conducting laminate discovery activities using 'Step Sanding Tool Kit' Plan repair activity Fibre, fabric, orientation & thickness records	<u>Theory, Demo &amp; Practical</u> Prepare step sanded repair surface for type B wet lay-up part using Step Sanding Tool Kit		<u>Theory, Demo &amp; Practical</u> Fibre to resin ratios Ply thickness calculations and variation De-bulk factors Bleed variation Calculation of bleed plies
<b>Thursday</b>	<u>Theory, Demo &amp; Practical</u> Prepare and apply materials to the repair surface Wet lay-up laminate repair using double membrane vacuum bag with bleeder plies	<u>Theory, Demo &amp; Practical</u> Tg point of parts Using infra-red lamps & temporary ovens for curing Positioning of thermocouples Recording of cure profile	<u>Theory, Demo &amp; Practical</u> Producing and using standard repair patches Pressure de-bulk of repair patch	<u>Practical</u> Prepare step sanded repair surface for type A pre-preg part using Step Sanding Tool Kit
<b>Friday</b>	<u>Theory, Demo &amp; Practical</u> Selection and sequence of vacuum bagging consumables  <u>Practical</u> Apply standard repair patch & vacuum bag	<u>Theory, Demo &amp; Practical</u> Using hot bonders & heat mats, for on part curing Positioning of thermocouples Determination & monitoring of cure profile	<u>Discussion &amp; Practical</u> Inspection, evaluation and review of repairs completed Completion of repair reports Destructive testing and inspection of repairs completed	<u>Reinstate Workshop</u>  <u>Written test</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



**dark matter composites ltd**

**Course Title: Producing Your Own Composite Parts**

**Course Code: DMSC60**

**Course Fees: £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)**

**Structure: 25% theory, 75% practical, 8 delegates maximum, no experience required**

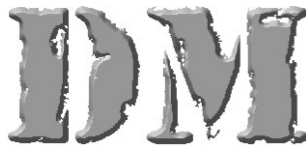
**Summary**

This course covers producing a part from a sketch through to a pattern, mould and component using a range of cost effective methods and materials to achieve good results. It includes how to set up a basic workshop environment for composite processes and cost effective investment.

This course is suitable for enthusiasts and small companies who want to make their own composite parts, expanding delegates' knowledge through expert guidance.

**Course Content**

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u> <u>Equipment issue</u> <u>Health &amp; Safety</u> <u>Theory</u> Introduction to composites theory, materials & processes	<u>Theory &amp; Demos</u> Tooling and component design principles Pattern making & materials Mould making & materials Laminate features	<u>Demo &amp; Practical</u> Production of a pattern using tooling board, including shaping, filling, surfacing, blocking up & final surface finishing using a range of bench tools and hand tools	
Tuesday	<u>Theory, Demo &amp; Practical</u> Pattern preparation & release agents Surface seal & release patterns	<u>Theory &amp; Demos</u> Wet lay-up laminating Wet lay-up calculations Material storage, dispensing, preparation & application Fume & exotherm control	<u>Practical</u> Wet lay-up laminating of a mould including material preparation, dispensing, gel coating, wetting out & consolidation of glass fibre chopped strand mat, brush & roller application methods	
Wednesday	<u>Theory, Demo &amp; Practical</u> Resin infusion laminating Trial panels & evaluation Designing infusion layout for parts Resin calculations	<u>Practical</u> Laminating a part for resin flow infused part including gel coating, application of cosmetic carbon fabric & structural glass fabric, application of distribution & infusion media	<u>Theory, Demo &amp; Practical</u> Vacuum bagging & materials Surface bagging of infusion parts Leak detection <u>Practical</u> Resin infusion of parts	<u>Demo &amp; Practical</u> Break out wet lay-up moulds <u>Theory, Demo &amp; Practical</u> Trimming & finishing composites Trim & post-cure wet lay-up moulds
Thursday	<u>Practical</u> Surface finish & release wet lay-up moulds for use <u>Theory</u> Pre-preg laminating	<u>Theory, Demo &amp; Practical</u> Pre-preg life, storing, defrosting, templating, ply orientation, nesting & kitting	<u>Demo &amp; Practical</u> Pre-preg application & laminating of first skins cosmetic skins of a carbon fibre part	<u>Theory, Demo &amp; Practical</u> Sandwich structures Core materials Core preparation
Friday	<u>Practical</u> Laminate structural core & closing skins of a pre-preg part <u>Demo &amp; Practical</u> Envelope vacuum bagging of pre-preg part	<u>Theory &amp; Practical</u> Curing pre-preg parts Basic ovens <u>Practical</u> Trim & finish composite parts produced	<u>Practical &amp; Discussion</u> Inspection of parts & identifying defects <u>Theory &amp; Discussion</u> Delegate case studies & guidance	<u>Reinstate Workshop</u> <u>Written test</u> <u>Equipment return</u> <u>Summary / Feedback</u>



## dark matter composites ltd

<b>Course Title:</b>	<b>Composites for Engineers &amp; Designers, Stage 1 - Materials &amp; Processes</b>
<b>Course Code:</b>	<b>DMSC61</b>
<b>Course Fees:</b>	£1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)
<b>Structure:</b>	60% theory, 40% practical, 10 delegates maximum, no experience required
<b>Pre-requisite:</b>	This is a high end course and delegates will need to have a sound technical background in materials, engineering or design, or have relevant experience

### Summary

This is our most intensive and in-depth course covering current composite materials and processes. It provides an insight into working with composite materials, their limitations and compromises. The sessions are informative, interactive and thought provoking, bridging the gap between practice and theory. The key focus is on component design principles, production considerations and controls, to form an intuitive and creative approach to composite engineering.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Health &amp; Safety</u> Measures & Legislation  <u>Theory &amp; Discussion</u> Composites history Composites theory	<u>Theory &amp; Discussion</u> Matrix materials Reinforcing materials Fabric types Laminate theory and ply orientation Lay-up specifications	<u>Theory &amp; Discussion</u> Sandwich structures Core materials Processing composite materials  <u>Theory &amp; Practical</u> Tooling care and preparation Release agents	<u>Theory &amp; Guided Practical</u>  Wet lay up laminating Design a laminate to suit a load requirement Production of a wet lay-up part including calculations, gel coat & laminate application
Tuesday	<u>Theory</u> Resin flow & film infusion laminating External & internal media with vacuum bagged & closed moulding  <u>Demo &amp; Practical</u> Trial panels & evaluation	<u>Theory &amp; Discussion</u> Vacuum bagging Bagging materials & methods Leak detection  <u>Guided Practical</u> Design of distribution media for resin flow infused part	<u>Guided Practical</u> Gel coating, application of fabrics, external distribution and infusion media, surface vacuum bagging and leak detection of resin flow infusion part	<u>Practical &amp; Discussion</u> Resin calculations Predicting flow fronts & infusion times Final resin flow infusion and evaluation of parts  <u>Demonstration</u> Resin film infusion laminating
Wednesday	<u>Theory, Demo &amp; Guided Practical</u> Pre-preg laminating Material templating, ply orientation, nesting & kitting  Design a laminate to suit a load requirement	<u>Theory</u> Processing & preparation of core materials  <u>Guided Practical</u> Pre-preg laminating of part with sandwich structure	<u>Demo &amp; Practical</u> Envelope vacuum bag & cure pre-preg part  <u>Theory</u> Matrix curing & post-curing, temperature & pressure profiles Tg points	<u>Theory &amp; Videos</u> Resin transfer moulding Hot press moulding Filament winding Pultrusion Automated tape laying & fibre placement
Thursday	<u>Theory &amp; Discussion</u> Causes of and identifying defects Manual & NDT inspection Production & quality controls In-service monitoring	<u>Theory, Demos &amp; Practical</u> Breakout parts produced Trimming & finishing composites	<u>Theory &amp; discussion</u> Adhesion & bonding methods  <u>Theory &amp; Demos</u> Failure modes Re-work & repair principles Repair techniques	<u>Guided Practical</u> GRP and pre-preg repairs including removal of damage, preparation of the repair surface & laminating of repairs  <u>Reinstate Workshop</u>
Friday	<u>Theory &amp; Discussion</u> Tooling and component design principles, types materials & life Re-cycling & environmental issues	<u>Practical &amp; Discussion</u> Case studies for tooling and component designs & problem solving	<u>Theory &amp; Discussion</u> Laminate calculations Finite element analysis Testing composites On-line resources	<u>Written test (1hour)</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>



dark matter composites ltd

## **DMSC 62 Course Update – March 2025**

This course update is for all delegates currently booked on or interested in our course 'DMSC62, Composites for Engineers & designers, Stage 2 - Advanced Design.'

Having broken down composites to an intuitive approach to the materials and processes in our stage 1 course, we have left many delegates at the end of the stage 1 course wanting to know much more. This has often led to many after course discussions as well as a lot of consultancy work for us, including problem solving, prototyping, tooling production through to complete design & development projects.

We have found, that through our consultancy work, delegates are able to understand our approach and gain further mentoring. However, many who have attended our DMSC61 course are not involved directly in composite design but are actively involved in composite production, addressing production problems, discussing composites with sub-suppliers and more on a regular basis.

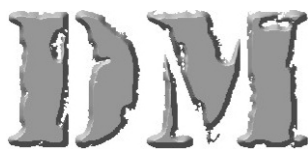
We have not removed any technical content from our stage 2 course but we have re-arranged it, added further content and revised some of the practical tasks accordingly. To this extent, our stage 2 course better reflects the way in which we take a holistic approach to anything composites and is aligned to current industry thinking for the future.

The course is not only suitable for anyone involved in composite design but anyone who is regularly involved in technical composites. The course still follows a structured problem solving approach during the practical sessions, which has been proven in accelerating prior delegates further understanding of composites. During exhibitions and conferences, we are regularly approached by past delegates who have attended our courses at some time in the last two decades, and have continue to move onwards and upwards in composites.

Having tried and broken a few AI text bots, we finally ended up with the new course title that we started with, 'DMSC62, Composites for Engineers & Designers, Stage 2 – Next Steps'. In simple terms for those that have attended our stage 1 course, we will mess even more with your heads.

Best Regards,

Rodney Hansen  
Managing Director



## dark matter composites ltd

**Course Title:** Composites for Engineers & Designers, Stage 2 – Next Steps  
**Course Code:** DMSC62  
**Course Fees:** £1,750.00 course fee plus £350.00 UK VAT (£2,100.00 per delegate)  
**Structure:** 25% theory, 75% practical, 12 delegates maximum  
**Pre-requisite:** Prior completion of DMSC61

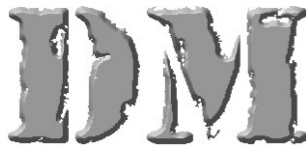
### Summary

This course picks up from where our stage 1 engineers and designers course ended. Having gained an intuitive approach to composites, we now build more layers onto this approach using structured problem solving of real issues and possible solutions. Originally the course was a bridge between production and design to aid communication between departments and to support training for CAE tools such as Fibresim. It has now evolved into a course that gives a lot of experience in a short time frame and accelerates delegates knowledge and understanding of composites. The course is suitable for anyone who has to deal with composites at any technical level.

### Course Content

	09:00 – 11:00	11:15 – 13:15	13:45 – 15:45	16:00 – 18:00
Monday	<u>Introduction</u>  <u>Equipment issue</u>  <u>Theory &amp; Demos</u> Recap on composite theory, materials & processes Material advances	<u>Theory &amp; Discussion</u> Composites as an alternative to traditional materials Conceptual & initial design aspects Environmental, economic & recycling in the design cycle	<u>Practical &amp; Discussion</u> Conceptual design Initial design of composite parts & structures Material & weight estimates Costing Estimates	<u>Theory &amp; Discussion</u> Orientation standards, part & mould side definitions & handling issues Balanced & unbalanced laminates Distortion & springback
Tuesday	<u>Practical &amp; Discussion</u> Design a range of laminates using various materials to address balanced, unbalanced, semi-isotropic, distorted, undistorted, springback & handed issues	<u>Guided Practical</u> Laminate materials to the designs completed Identify further problems due to material application Vacuum bag & cure parts	<u>Theory &amp; Discussion</u> Ply datums & placement Draping, distortion, deviation & sequences Joins, splices, darts, discontinuities & sequences Production of lay-up manuals	<u>Practical</u> Design of laminates over a range of shapes/features to address datums, placement, draping, distortion, deviation, joins, darts, discontinuities, & laminate sequence issues
Wednesday	<u>Discussion</u> Review of laminate designs and potential issues  <u>Practical</u> Prepare material plies to the laminate designs completed	<u>Guided Practical</u> Laminate materials to the designs completed Identify, record & solve problems encountered due to material application Vacuum bag & cure parts	<u>Theory &amp; Discussion</u> Metal verses composite tooling & thermal expansion issues Tooling & component features & design principles Tiled and templated laminating methods for composite tooling	<u>Demo &amp; Practical</u> Preparation of patterns including fitting split/joint boards, shaped locators & releasing Lamination of a mould tool using tiled, orientated and balanced plies and vacuum de-bulks
Thursday	<u>Practical</u> Design of a range of composite mould tooling over a range of shapes/features to address both laminate and production process requirements	<u>Discussion</u> Review of mould tooling designs in relation to laminate and production requirements and potential issues	<u>Theory &amp; Discussion</u> Structural laminate & ply loading requirements Consideration shape, joins, inserts and fixings	<u>Practical</u> Complete simple indicative calculations to establish initial processes, materials, insert design and structural laminate requirements
Friday	<u>Discussion</u> Review of calculations completed and initial laminate designs and potential issues	<u>Practical</u> Design of mould split lines, laminate & ply sequence to meet structural requirements Compilation of lay-up manual to produce the structural parts	<u>Discussion</u> Review of designs to meet structural requirements and potential issues	<u>Written Test</u>  <u>Reinstate Workshop</u>  <u>Equipment return</u>  <u>Summary / Feedback</u>





**dark matter composites ltd**

## ***Course Enrolment Conditions***

1. These Course Enrolment Conditions apply to all training services provided by Dark Matter Composites Ltd (DMC). Customer's Terms & Conditions or deviations from these are not applicable unless agreed in writing.
2. It is the customers' responsibility to check that the course is suitable for its delegate(s) training needs. We shall advise on course content and anticipated outcome as requested.
3. Enrolments are taken on a first come, first served basis and shall only be confirmed on receipt of completed enrolment forms and receipt of full payment.
4. For company and group bookings, an enrolment form must be completed for each delegate.
5. Courses will be confirmed as running as soon as sufficient applications are received and no later than 2 weeks prior to the course start date. Bespoke courses will be confirmed on receipt of full course payment.
6. All course fees are per delegate per course and include: provision of all materials, tools and protective clothing (except footwear, see below); lunch, tea & coffee for each day of the course; and course handouts.
7. Payment of course fees are due prior to the course start date. Prices stated are in pounds sterling.
8. Travel, accommodation and general sustenance expenses incurred by delegates are excluded from the course fees (except where otherwise stated).
9. Cancellations by delegates prior to the course will be refunded on the following basis: 14 calendar days or more 80%; less than 14 calendar days no refund. If a cancellation is unavoidable by DMC, an alternative date or full refund will be given.
10. Transferral of bookings applies to a change in course or course date and must be completed 14 calendar days prior to the start of the original course booking. Each transferred booking, will be subject to an administration and materials charge equivalent to 20% of the course fee. A maximum of two booking transfers will be processed. Outside of these transfer terms, cancellation terms will apply.
11. Delegates must advise DMC of any dietary requirements or special needs on enrolment.
12. The outcome and achievement of delegates is based upon the ability and attendance of the individual delegates.
13. DMC shall not be liable for any kind of damage arising directly or indirectly out of or in connection with the performance or non-performance of the training, unless such damages are caused by the gross negligence or intent of DMC or its employees.
14. Delegates attending DMC courses must comply with safety procedures covered at the start of and during each course. DMC seeks to achieve the highest standards in health, safety and the environment and anticipate that customers and their delegates will assist us in achieving these objectives.
15. Delegates must wear full-length trousers and closed leather shoes or safety boots (no trainers or fabric footwear) during the course. Delegates who do not wear appropriate clothing and footwear will not be able to take a full part in practical sessions.
16. Marked tools and equipment shall be issued and checked with delegates at the start of the course. Delegates may be charged for tools and equipment not returned.
17. Copyrights on licensed material provided by DMC remain with DMC. Copyrights on third party licensed materials remain with identified third parties. Licensed materials include but are not limited to all course documentation, manuals and instructions in electronic or printed form. The Customer/Delegate shall not copy, make accessible or distribute licensed material to third parties without DMC's prior written consent.
18. The Customer/Delegate acknowledges and agrees that a breach of copyright cannot be compensated adequately by an award of damages or indemnity or other pecuniary remedy and DMC shall be entitled in the event of any such breach to the remedies of injunction specific performance or other equitable relief to redress any such breach.
19. DMC will treat any information about delegates and/or any internal business information of the Customer/Delegate as confidential.
20. The validity, construction and performance of these conditions shall be governed by the Laws of England.

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