

Welcome to the Engineering & Resistant Materials Department

Our Aims

Our department is a successful department which is forward thinking in its delivery of all Key Stages 3, 4 and 5. Our aims are to provide excellent opportunities for students to:

- Enjoy turning ideas into reality.
- To strive to achieve successful outcomes.
- Be creative and develop creative thinking skills.
- Work independently and develop self-esteem.
- To develop attitudes of curiosity, enquiry, initiative, ingenuity, resourcefulness.
- To experience a range of different material areas.

We have high expectations of all our students and lead by example. We deliver our curriculum with a consistent and co-ordinated approach to provide stretch, challenge and inspiration to all students.

Department Information

Engineering & RM is taught in 4 specialist rooms. One room is fully equipped and has ICT and printing access, this room is fully equipped with CAD/CAM equipment, which includes our laser cutter, state of the art 3D printer and our CNC Router.

The two practical workshops offer students a wide range of facilities and access to work with all materials. We have one room dedicated to woodwork with specialist machinery and a second room with Engineering specialist machinery. All rooms have access to CAD and laptop computers that all have wireless connection to the school network and the internet; this enables flexibility in our teaching of CAD.

We also encourage students to use our school library as this is a valuable resource housing a wide range of books linking to the specialist area and further access to ICT if students wish to continue their work outside of lessons.

Department Staffing

David Murphy- Head of Faculty

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Edward Brick- Teacher of Resistant Materials & Engineering

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Darren Richardson – Dedicated Design & Technology Technician

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Resistant Materials & Graphics Key Stage 3

Key Stage 3 – D&T

At North Oxfordshire Academy we aim to develop a broad range of skills and knowledge through the use of project-based learning. The course is guided by the requirements of the National Curriculum for Technology, where-by students learn and develop a range of skills which include; designing, making, analysing, problem solving and evaluating.

The DT department consists of a range of purpose built specialist rooms which include a CAD/CAM room, two multi material workshops and a graphics room. All of our specialist rooms are well equipped and students have sole access to laptops, 3D Printers, colour printers, a laser cutter, CAM machinery and a wide range of hand tools.

Key Stage 3 Programme of Study (Timeline)

The students will follow a rotation system for blocks of nine or ten weeks where they will experience the following areas: Resistant materials, Graphics, Hospitality & Textiles then within these they will incorporate graphics and electronic elements.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Yr.7 RM	Pencil Holder & Design Portfolio		Pencil Holder & Design Portfolio		Pencil Holder & Design Portfolio	
Yr.8 RM	Model plane & Design Portfolio		Model plane & Design Portfolio		Model plane & Design Portfolio	
Yr.9 Taster	Picture frame & Design Portfolio		CAD/CAM		Wooden Puzzle	Structures

Resistant Materials

The Resistant Materials KS3 course introduces students to a variety of materials. Students explore and develop design approaches and produce viable solutions to given situations. To ensure students an experience of real life working practices, constraints are built into the "situations" and "design briefs". The KS3 scheme of work ensures there is progression and continuity and prepares students for the challenges of the KS4 syllabus.

Home Learning

All parents are encouraged to support their child by checking 'Go for Schools' and staff within the faculty set homework regularly for students using this resource.

At KS3 homework is set once a week for each of the classes we teach.

Students are expected to complete weekly homework in preparation for their controlled assessment tasks for their final grade. This assessment tests the understanding of research stages right through to the final making and includes testing and evaluation elements.

Web Links

These websites are helpful to all students studying Design & Technology at KS3 or KS4 and are useful for parents wishing to further support students in their home learning tasks.

<http://www.bbc.co.uk/schools/gcsebitesize/design/resistantmaterials/>

<http://www.bbc.co.uk/schools/gcsebitesize/design/graphics/>

<http://www.technologystudent.com/>

<http://www.design-technology.info/resistantmaterials/>

BTEC Engineering Key Stage 4

Are you interested in an exciting career in Engineering? Would you like to go into product design, aerospace, manufacturing, electronics, electrical engineering, or the automotive industry as a project leader or designer? Do you want to go on to university level study or enter employment at technician level? Engineering is the wide-ranging profession of applying scientific principles to the design and construction of various industrial and domestic products to benefit society and the environment.

BTEC First Award in Engineering (Level 2)

The BTEC Level 2 first award is a two-year practical, theory & work-related course. You learn through the completion of projects and assignments that are based on real-life workplace situations, activities and demands. It introduces you to the employment area you have chosen and provides a good basis to go on to a more advanced work-related qualification such as sixth form Level 3 Engineering, the National Diploma or an Engineering Apprenticeship. A BTEC Level 2 first award is equivalent to one GCSE grades A*– C.

You will study three units over two years covering a range of engineering related subjects which give you an understanding of the skills, qualities and knowledge needed to work in this field. Over the two years of the course you will study:

- Unit 1: The Engineered World
- Unit 2: Investigating an Engineering product
- Unit 7: Machining techniques

Is BTEC Subsidiary Diploma in Engineering suitable for me?

The award is suitable for anyone interested in manufacturing processes, learning how things work and some practical engineering skills. You may be thinking about a career in one of the many branches of engineering such as mechanical, civil and design or you may be considering a manufacturing or industrial engineering career/ architecture or construction based career.

Why BTEC?

Some people are unsure whether to do BTEC courses as they do not know what is involved or whether they mean as much as GCSEs. They do! The BTEC award in this subject will be equivalent to a GCSE and will always be taken into consideration in further education. The wide base of practical, vocational skills which the course provides makes it an excellent starting point if you are interested in continuing into further or higher education or entering employment.

How will I learn?

Most lessons will be taught in our new state-of-the art equipped facilities. This has a dedicated CAD/CAM room and two superbly equipped engineering workshops. For much of your time on the course you will be carrying out assignment based projects. You will be expected to spend at least three hours per week on private study to complete these projects.

How will I be assessed?

The BTEC first award includes 75% coursework which is assessed in school and a 25% external exam. Your projects are submitted for marking on a regular basis throughout the course. They are assessed internally by your teachers and then moderated by the board. Work is graded and written feedback is provided to enable you to gauge how well you are doing on the course. Feedback will help you to see the strengths of your work, as well as allowing you to reflect on areas which can be developed further. Your work will be graded pass, merit or distinction.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Yr.10Eng.	Model Car		Metal Clock		Machining Techniques	
Yr.11Eng.	Investigating an Engineered Product			The Engineered World		

Home Learning & Independent Study Expectations

All deadlines for Home learning are issued on 'Go for Schools'.

All activities and help sheets are kept in the KS4 Engineering folder on the school network. Please use the following specification to help you ensure you are completing all your coursework to the correct assessment and grading criteria. Specification;

http://www.edexcel.com/migrationdocuments/BTEC%20Firsts%20from%202012/BF031439_SPEC_BTEC_L_1_2_AWARD_IN_ENGINEERING_ISS_2_NEW.PDF

Exam papers

As it is a relatively new award so there are only a few sample and past papers. Mock exam papers will be uploaded throughout the year.

Resistant Materials Key Stage 4

Why should I choose this subject?

Resistant Materials is a practical based subject which encourages you to combine your designing and making skills with knowledge and understanding in order to produce a high quality product. What makes this course enjoyable is that you will learn how to do things through practical learning in the workshop and classroom.

Resistant Materials Edexcel GCSE

The aim of the Resistant Materials curriculum is to provide each and every student with the opportunity to develop a knowledge and understanding of a broad range of practical skills and techniques both graphically on paper and in relation to actual 'resistant materials' i.e. metal, plastic, wood, electronic components and circuits. Resistant Materials Technology is a popular subject and students have the opportunity to be creative and independent. Students can also explore their design creativity in their folder work and express themselves graphically in the form of sketches and drawings.

How will I learn?

Most lessons will be taught in our new state-of-the art equipped facilities. This has a dedicated CAD/CAM room and two superbly equipped engineering workshops. For much of your time on the course you will be carrying out assignment based projects. You will be expected to spend at least three hours per week on private study to complete these projects. Knowledge organisers will also support your theory and understanding at home and guide you in revision across the course.

What will I learn?

You will learn about materials, how to join them together, how to mark them out accurately as well as choosing and using tools correctly. You will also be taught how to use Computer Aided Design (CAD) software and how to disassemble and evaluate existing products. This is an enjoyable subject for those pupils who like to make things and it also develops your creative skills and independent problem solving skills.

How will I be assessed?

The controlled assessment project is worth 60% of the course. It is very important and you will be able to select an item that you would like to make. Once you have decided what you are making, you will need to create a written portfolio of work which will include a situation, a design brief, research initial designs and developed ideas, models and comments on you how tested and evaluated your designs. From January, you will revise for your written

examination which is worth 40% of the total marks allocated. You will learn elements of theory throughout Year 10 and 11 and you will be regularly tested on this using memory platforms. This builds your knowledge gradually over the length of the entire course.

Title	Weighting	Exam												
Controlled Assessment Task -Design and make Resistant Materials project	60% 90 marks Approx. 45 hours curriculum time To produce 20 A3 pages	Controlled Assessment Based on the following: <table style="float: right; border: none;"> <thead> <tr> <th></th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Investigating the design context</td> <td>8</td> </tr> <tr> <td>Development of design proposals</td> <td>32</td> </tr> <tr> <td>Making</td> <td>32</td> </tr> <tr> <td>Testing and evaluation</td> <td>12</td> </tr> <tr> <td>Communication</td> <td>6</td> </tr> </tbody> </table>		Marks	Investigating the design context	8	Development of design proposals	32	Making	32	Testing and evaluation	12	Communication	6
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Resistant Materials Examination	40% 120 marks 2 hours	Exam Section A 30 marks A design question based on context supplied before the exam Section B 90 marks Covers all aspects of the specification content												

	Term 1				Term 2	Term 3	Term 4	Term 5	Term 6
Yr.10RM	W	P	M	S	CAD/CAM		Solidworks	Design Brief	
Yr.10 RM	Controlled Assessment						Exam prep.		

Where will this subject take me?

This subject really helps you if you want a career in engineering, construction, plumbing, design, electrical installations, carpentry, motor mechanics, landscape gardening, farming, etc. Resistant Materials is useful as it develops your confidence when working with materials such as wood and metal which can be used in later life when engaged in DIY projects or repairing household objects.

In year 11 students often take their design portfolios and pictures of the products they are making to interviews. Potential employers and college tutors look favourably upon this work as it shows them what you are capable of doing and that you can work independently.

This course also provides excellent preparation for further studies such as A' level product design, and also a wide range of NVQ courses which can lead to degree courses.

Home Learning & Independent Study Expectations

All deadlines for Home learning are issued on 'Go for Schools'.

All activities and help sheets are kept in the KS4 Resistant Materials on the school network. Please use the following specification to help you ensure you are completing all your coursework to the correct assessment and grading criteria.

Specification:

http://www.edexcel.com/migrationdocuments/GCSE%20New%20GCSE/GCSE_DT_Resistant_Materials_Spec.pdf

Exam Papers and Mark Schemes:

<http://www.edexcel.com/quals/gcse/gcse09/dt/Resistant/Pages/default.aspx>

BTEC Engineering Key Stage 5

For your new BTEC Nationals courses, we're building on what you've told us you value most:

- The flexible range of course sizes
- Up-to-date, vocational content
- A practical approach to assessment
- Credibility with higher education and employers to support student progression.

Extended Certificate 360 GLH Single Engineering	
Equivalent to 1 A Level	
A broad basis of study for the engineering sector.	Supports progression to higher education as part of a larger programme of study which includes other vocational or general qualifications, such as other BTEC subjects or A Levels.
Foundation Diploma 540 GLH Double Engineering	
Equivalent to 1.5 A Levels	
Two-year course made up of three lessons a week covering the skills and knowledge required for the engineering sector.	Further year of study at Level 3 or to higher education if part of a wider programme of study, alongside other BTEC Subjects or A Levels.

Extended Cert.	Diploma
Total: 4 Units	Total 7 Units
3 Mandatory Units	4 Mandatory Units
1. Engineering Principles	1. Engineering Principles
2. Delivery of Engineering Process Safety as a Team	2. Delivery of Engineering Process Safety as a Team
3. Engineering Product Design and Manufacture	3. Engineering Product Design and Manufacture
	4. Applied Commercial and Quality Principles in Engineering
1 Optional Units	3 Optional Units

Overview

The Engineering sector

Engineering is a dynamic sector that offers huge potential for students. Engineering turnover was £1.1 trillion in the year ending March 2012, and it accounts for 24.5 per cent of the turnover of all enterprises in the UK. The UK is regarded as a world leader in engineering sectors including renewable energy, space, low carbon, aerospace, creative industries, utilities, automotive, agrifood and bioscience. Between 2010 and 2020 engineering enterprises are projected to have 2.74 million job openings, including more than 400,000 technician roles (as the predominantly ageing workforce in this area is expected to retire in this period).

Who is this qualification for?

The Pearson BTEC Level 3 National Foundation Diploma in Engineering is intended to be an Applied General qualification for post-16 students who want to continue their education through applied learning and who aim to progress to higher education, and ultimately to employment, possibly in the engineering sector. The qualification is equivalent in size to 1.5 A Levels and aims to provide a coherent introduction to study of the engineering sector. Students need not necessarily have studied engineering previously, but will have successfully completed a Level 2 programme of learning, with GCSEs or vocational qualifications.

What does the qualification cover?

The content of this qualification has been developed in consultation with academics to ensure that it supports progression to higher education. In addition, employers and professional bodies have been involved and consulted in order to confirm that the content is also appropriate and consistent with current practice for students who may choose to enter employment directly in the engineering sector. Everyone taking this qualification will study four mandatory units:

- Engineering Principles
- Delivery of Engineering Processes Safely as a Team
- Engineering Product Design and Manufacture
- Applied Commercial and Quality Principles in Engineering.

Students choose three optional units to support choices in progression to courses in HE, and to link with relevant occupational areas. They cover content areas such as:

- computer aided design
- pneumatic and hydraulic systems
- electronic devices and circuits
- computer programming
- 3D printing and rapid prototyping
- programmable logic controllers
- CNC machining
- welding.

In addition, the qualification includes an optional work experience unit so all students can benefit from practical experience of the sector.

What could this qualification lead to? Will the qualification support progression to further learning, if so, what to?

Students who have completed this qualification in a year may progress to further learning at level 3, for example, a second Foundation Diploma in a complementary sector, or to a larger size BTEC National in the Engineering sector.

In addition to the engineering sector specific content outlined above, the requirements of the qualification will mean students develop the transferable and higher order skills that are highly regarded by both HE and employers. For example, when studying the *Applied Commercial and Quality Principles in Engineering* unit, students will develop an understanding of how key business activities and trade considerations affect engineering organisations, and how these can be used to create a competitive advantage. Students will also understand about quality processes, and the techniques and tools used to monitor and improve quality, such as value stream mapping.

The qualification is intended to carry UCAS points and is recognised by HE providers as contributing to meeting admission requirements for many courses, if taken alongside other qualifications as part of a two-year programme of learning, and it combines well with a large number of subjects. It will support entry to HE courses in a very wide range of disciplines, depending on the subjects taken alongside. However, for students wishing to study an aspect of engineering in HE, opportunities include:

- BSc Hons in Electrical Engineering, if taken alongside AS/A Levels in Mathematics and a science subject (e.g. Physics)
- BSc (Hons) in Architectural Engineering, if taken alongside a BTEC National Foundation Diploma in Construction and the Built Environment
- BSc (Hons) in Computer Science, if taken alongside a Pearson BTEC Level 3 National Foundation Diploma in Computing
- BSc (Hons) in Maths or Physics, if taken alongside AS/A levels in Maths and Physics.

Students should always check the entry requirements for degree programmes at specific HE providers.

Will the qualification lead to employment, if so, in which job role and at which level?

The Pearson BTEC Level 3 National Foundation Diploma in Engineering has a primary focus of progression to higher education alongside additional qualifications.

Students can progress to employment on achieving this qualification. However, these are likely to be entry level roles in the Engineering sector, and they are more likely to be employed as an Apprentice, where they will complete additional training and qualifications to gain the skills and knowledge required to succeed in the sector as an engineering technician.

If there are larger and/or smaller versions of this qualification, or it is available at different skills levels, why should the student choose this one?

The **Pearson BTEC Level 3 National Foundation Diploma in Engineering** is equivalent in size to 1.5 A Levels and is for students looking for a two year course of part-time study, or alongside another area of study that contrasts or complements the Foundation Diploma in Engineering over a two-year, fulltime study programme, with a view to progressing to a range of HE courses. The suite also includes the following qualifications.

The **Pearson BTEC Level 3 National Extended Certificate in Engineering** is equivalent in size to 1 A Level. It is for students interested in learning about the sector alongside other fields of study, with a view to progressing to a wide range of HE courses, but not necessarily in engineering.

The specialist qualification is as follows.

● **Engineering** – aimed at giving students a wider view of the sector, which can include elements of mechanical, electrical and manufacturing engineering.

This qualification is supported by the following organisations Higher education

- The University of Manchester
- University of Sheffield
- University of Exeter
- University of Huddersfield
- Kingston University
- Southampton Solent University
- University of the West of England
- Harper Adams University

Professional and trade bodies

- The Society of Operations Engineers (SOE)
- Royal Aeronautical Society

Employers

- Rolls Royce
- Liebherr Sunderland Works Ltd
- GKN Aerospace
- Wilson Tool International LTD
- BTEC

<p>Set and marked by: Centre (School)</p> <p>Verified by: Pearson</p>	<p>Set and marked by: Pearson</p>	<p>Set and marked by: Pearson</p>
<p>What's involved Students complete a series of tasks set in a work-related scenario which you can tailor to local industry needs.</p>	<p>What's involved Students complete, in controlled conditions, a task tackling an everyday challenge; some tasks also draw on pre-released information.</p>	<p>What's involved Students draw on essential information to create written answers to practical questions in test conditions.</p>
<p>What's the result? Your students generate authentic evidence, drawing on their knowledge and skills to complete a practical project over a period of time, working either individually or in a team.</p>	<p>What's the result? Your students show they can apply their learning successfully to situations they could encounter regularly in the workplace or on a higher education course.</p>	<p>What's the result? Your students can confidently recall and apply technical knowledge, a skill which provides a solid foundation for working life and further study.</p>

Specification:

<http://qualifications.pearson.com/en/qualifications/btec-nationals/engineering-2016.html>