

# Making Your Engineering System Anchor Choice





## INTRODUCTION

1. The DESG Graduate Scheme lasts for two years of Initial Professional Development (IPD) 1. During which you will undertake work placements, training courses and other development opportunities to prepare you for your first professional posting in Defence Equipment & Support (DE&S).
2. Work placements are the most fundamental aspect of IPD1 and allow you to put into practice your knowledge gained through previous education and work experience and training on the graduate scheme. These will be mainly based in Bristol and the wider United Kingdom, and on occasion overseas.
3. Every DESG graduate will undertake a essential set of core learning and development activities throughout the scheme. The level of mandatory functional training will vary between Engineering System Anchors (ESA).
4. After successfully completing the DESG Graduate Scheme you may have the opportunity to join the Guided Development Scheme (GDS) which covers IPD2 period towards Professional Registration. This is a development scheme open to the majority of DE&S engineers and scientists to aid career progress and progression. Some ESAs run their own IPD2 scheme so are not eligible for GDS, the development opportunities however are very similar.

## MAKING YOUR ESA CHOICE

5. You will be allocated an ESA in accordance with your preference, skills and the business requirements for engineers/scientists to work within a particular specialist area. This enables you to plan your overall training programme to provide you with sufficient experience in aspects of your ESA to perform effectively after completing the DESG Scheme.
6. In order to make a choice and before deciding on your preferences regarding an ESA you must first determine your eligibility for each one using the *ESA Degree Applicability Chart*. The table shows which degree, by broad discipline subject, are applicable to each ESA.
7. A summary of what you can expect regarding typical roles, location and training on the DESG Scheme has been provided for each ESA. A summary of the terminology is given in the glossary.
8. To help you make your ESA choice it can be useful to have some insight from graduates that are already working in these areas. Therefore, for your background information, some anecdotal thoughts from a selection of the DESG graduates have been included. Each graduate has written their contribution in their own individual style, highlighting the points that they think you may be most interested in.

## **GLOSSARY**

### **Example Roles/Placements**

9. DE&S Project Teams:
  - a. Procure, assess and bring into service new equipment
  - b. In-Service Support to operational military equipment
  - c. Life extension
  - d. Disposal and decommissioning
10. Wider MOD/Other Government Departments (OGD):
  - a. Research and technical support for DE&S
  - b. Capability planning and development
  - c. Defence Strategy and Policy
11. Military Operators
  - a. Front Line Commands
  - b. Operators and maintainers
  - c. Test and Evaluation units
12. Industry
  - a. Research of concepts
  - b. Design and development
  - c. Production and manufacture
  - d. Test and acceptance
  - e. Maintenance and overhaul
  - f. Decommissioning
13. International
  - a. Concept design and research
  - b. British Embassy Technical Policy
  - c. EU/Other Nations collaborative projects

### **Locations**

14. Permanent Duty Station (PDS): your base for the duration of the Graduate Scheme (with a number of placements away) and where you will be expected to commence your first professional posting on completion of the DESG Scheme.
15. Example placement locations:
  - a. Bristol and Corsham (DE&S and Industry)
  - b. Wider UK (DE&S, MOD, OGD, Military and Industry)
  - c. International (DE&S, MOD, OGD, Military and Industry)
16. Example first professional posting locations:
  - a. Bristol and Corsham (DE&S)
  - b. Scotland, Portsmouth, Manchester, London (limited DE&S posts)

### **Courses and Further Learning**

17. Core, Acquisition and Project Management: broader courses relevant to all
18. ESA Functional:
  - a. Mandatory: must be completed on the Scheme.
  - b. Potential Opportunities: dependant on development need and existing qualifications.

## ENGINEERING SYSTEMS ANCHOR (ESA) – DEGREE APPLICABILITY CHART

Accredited Engineering or Science Degrees	Aero	CAAS	C4ISR		Land	Maritime			WOME		Nuclear	
			ISTAR	ISS		NA	ME	CS	W	OME	NW	NP
Naval Architecture		X				X	X					
Systems Engineering	X		X	X	X	X		X	X	X		
Electronic/ Electrical Engineering	X	X	X	X	X		X	X	X	X	X	X
Mechanical Engineering	X	X			X	X	X		X	X	X	X
Telecommunications Engineering			X	X								
General Engineering	X	X	X		X	X	X	X	X	X	X	X
Engineering Science	X	X	X		X	X	X	X	X		X	X
Marine Engineering		X				X	X					
Avionics		X				X	X		X		X	X
Automotive Engineering		X			X						X	X
Aeronautical/ Aerospace Engineering	X	X				X	X		X		X	X
Computer Systems, Information Systems and Communications			X	X				X				
IT/Computer Science			X	X				X	X		X	
Mathematics		X	X	X							X	
Physics		X	X	X					X	X		X



# ESA: AEROSPACE

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The Aerospace ESA will prepare you for a role in military tri-service aircraft engineering at a platform and systems level. This spans the fleet of UK fast jets, transport and refuelling aircraft, unmanned air vehicles, helicopters, air launched weapons, airfield support, aircrew survival equipment and more.</li> <li>2. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS</li> <li>b. Wider UK - aerospace industry and MOD/OGD establishments</li> <li>c. International – Germany</li> </ol> </li> <li>3. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Air Pilot Experience Course</li> <li>ii. Elementary Ground Flight Training School</li> <li>iii. MSc Military Airworthiness/Aerospace Engineering (1 year full time)</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<p><b>DE&amp;S Project Teams:</b></p> <ul style="list-style-type: none"> <li>• Combat Air: Lightning II, Typhoon</li> <li>• Helicopters OC: Chinook, Lynx Wildcat</li> <li>• Air Support: Hercules, C-17, A400M</li> <li>• Air launched weapons</li> </ul>	<p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• BAe Systems – Fast Jet manufacture</li> <li>• Agusta Westland – Helicopter build programmes</li> </ul>
<b>Example DESG Placements</b>	<p><b>Wider MOD/Military/OGD:</b></p> <ul style="list-style-type: none"> <li>• Air Warfare Centre – Capability development</li> <li>• Dstl – Air research</li> <li>• Test and Evaluation Squadron</li> <li>• Military Aviation Authority – Safety &amp; Airworthiness</li> </ul>	<p><b>International</b></p> <ul style="list-style-type: none"> <li>• NETMA (Germany) – Multinational collaboration for Tornado and Typhoon</li> </ul>

# **Name: Tom**

## **Degree: Electronic Engineering**

I have really enjoyed how the DESG scheme has allowed me to design my own progress and plan my two years in a way that suits me. Initially, I spent 4 months working with an Engineering Operations team at RAF Henlow with whom I have travelled to dozens of UK MOD sites and, notably to Bahrain to work with the Royal Navy.

I then spent 5 months working in industry with Rockwell Collins UK which included travel to Norwegian Defence Department in Oslo and interaction with many defence contractors both UK and international. Then to increase my knowledge of defence at a strategic level I undertook 3 months work in Whitehall, London. This gave me a unique opportunity to see how decisions are made at a much higher level than I had previously seen.

Choosing the Aerospace ESA has allowed me to complete several specialist training courses on Military aircraft including a fully sponsored, two week flying scholarship in Scotland. I have also been lucky enough to be scheduled to fly in an RAF Hawk later this year. During my first year, I have undertaken many other training courses; some examples include practical leadership, project management, environmental protection and presentation skills.

Along with the other graduates in my group I have visited the Houses of Parliament, the Apache maintenance hub at Middle Wallop and completed Helicopter 'dunker' (Underwater Escape) training with the Royal Navy.

The graduate scheme has also permitted me to apply for service in the Reserve forces and to receive special paid leave while training, something that many employers will not support.





# ESA: COST ASSURANCE AND ANALYSIS SERVICE (CAAS)

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The CAAS ESA provides a diverse range of opportunities to develop a good understanding of the business and train in the area of Cost Engineering, there is the opportunity to specialise in a particular area such as Air, Fleet or Land upon completion of the scheme by which time the requirements for the “Licence to Practice (Graduate)” would have been achieved.</li> <li>2. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS (most likely)</li> <li>b. Portsmouth/Scotland/ Manchester/ Yeovilton– PDS (alternate)</li> <li>c. Wider UK - Industry and MOD/OGD establishments</li> <li>d. International – USA, Europe</li> </ol> </li> <li>3. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> <li>ii. Cost Engineering Directed Development</li> <li>iii. Cost Engineering Project Case Studies</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Dependant upon specialism area but MSc generally not offered</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<p><b>DE&amp;S Project Teams:</b></p> <ul style="list-style-type: none"> <li>• Aircraft carrier Alliance</li> <li>• Future Submarines</li> <li>• A variety of other large and medium sized procurement projects across the domains.</li> </ul>	<p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• BAE Systems</li> <li>• Babcock</li> <li>• Cammell Laird Shipbuilders</li> </ul>
<b>Example DESG Placements</b>	<p><b>Wider MOD/Military/OGD:</b></p> <ul style="list-style-type: none"> <li>• Dockyards</li> <li>• DSTL</li> <li>• Front Line Commands</li> </ul>	<p><b>International</b></p> <ul style="list-style-type: none"> <li>• NETMA Germany</li> </ul>

**Name: Gavin**

**Degree: Computer Aided Engineering**

CAAS is the MOD's centre of excellence for the costing and pricing of defence equipment. CAAS enables the continuous improvement of the process by which the MOD acquires the equipment needed by the UK's Armed Forces - and so enables risk reduction; ensuring the best value for money for the defence of the United Kingdom.

As a graduate engineer, the suite of dedicated CAAS training courses will take you on the path to professional chartership; this includes a 2 week induction; which will provide you with a thorough grounding in the role of CAAS and the important and fascinating work that you will be trained to do.

My first live task was to audit a pricing contract for a military combat aircraft at a large defence contractor. This involved going to the contractor's site and obtaining the relevant information required to complete the task. Additionally to this the Contractor afforded me a guided tour around the facility so I could physically see the items that were on the price list. The tour guided me through the main part of the facility where all the parts are manufactured and inspected to high specifications. The sheer magnitude of the production line was an awe inspiring experience.

Another memorable task was to investigate costs associated with the new class of nuclear submarine reactors. As I had never worked in the nuclear industry and knew relatively nothing regarding the mechanics of nuclear reactors and I had a steep learning curve. However, the experience and knowledge gained from this task enabled me to become familiar and even talk to subject matter experts (SME) on an intermediate level.

# ESA: Command, Control, Computing and Communications Intelligence Surveillance Reconnaissance (C4ISR)

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The C4ISR ESA is centred on the acquisition and support of new and existing systems. This anchor is split into two streams ISTAR and ISS.</li> <li>2. ISTAR (Intelligence, surveillance, target acquisition, and reconnaissance) covers the integration of surveillance, sensors, command and control to achieve operational effect. This discipline is generally integrated across operating centres as such the platforms vary widely.</li> <li>3. ISS (Information Security Systems) focuses on the network capability and deployed infrastructure elements of the business and provides the global linkages for the ISTAR elements.</li> <li>4. If you are interested in the Maritime aspect please see Maritime CS as this is a separate discipline.</li> <li>5. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS (ISTAR)</li> <li>b. Corsham – PDS (ISS)</li> <li>c. Wider UK - maritime industry and MOD/OGD establishments</li> <li>d. International – USA, Europe</li> </ol> </li> <li>6. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. MSc opportunities available in a variety of specialist disciplines</li> <li>ii. Specialist courses in communications and other specialist disciplines</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<b>DE&amp;S Project Teams:</b> <ul style="list-style-type: none"> <li>• Aerial Target Systems Project team</li> <li>• Naval Electronic Warfare Project team</li> <li>• Typhoon (Eurofighter) Project team</li> </ul>	<b>Industry</b> <ul style="list-style-type: none"> <li>• Multiple communications suppliers</li> <li>• Thales Optronics</li> </ul>
	<b>Wider MOD/Military/OGD:</b> <ul style="list-style-type: none"> <li>• Air Warfare Centre</li> <li>• Royal school of Artillery</li> </ul>	<b>International</b> <ul style="list-style-type: none"> <li>• British Embassy Washington</li> </ul>

## **Name: John**

## **Degree: Computer Science**

After an initial five-month placement working on networking and interoperability policy which was a great introduction to the MOD and how the systems are set up I moved onto to DTSL to work in the research area. While I was there I was able to use my skills to really contribute to two important projects that have since been proven successful on the front line. The work saw me running models of new systems and liaising with military staff from instructors at the Royal School of Artillery to the commander of Khandahar Airbase, and almost saw me get a trip out to Iraq! Knowing that my resulting reports would be generating tangible Defence benefits – “saving lives”, as we try and convince people when showing off! – was both exciting and truly satisfying.

I then moved to NATO in Brussels, I was working in a very demanding and interesting multinational environment developing network applications. The placement saw me travel to important meetings in Germany and Luxembourg, where I presented my work to people from a variety of countries and disciplines. The opportunity to work abroad was enlightening and did wonders for my development, cementing my communication skills by testing them to the limit.

My fourth placement was an industrial placement, working for a private company in Poole, Dorset. The company in question often handled Defence contracts, particularly for bomb disposal robots and other equipment, but as a member of staff I was expected to help out on a variety of non-Defence contracts as well. Seeing life from the other side of the wall was eye-opening, and a valuable experience that has given me increased insight while dealing with contractors. It also gave me an opportunity to hone my technical skills, as I was often required to help in the workshop.

# ESA: Land

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The Land ESA will prepare you for an exciting job in the land forces support areas at platform and systems level. This spans the fleet of UK military vehicles from tanks to quad bikes, heavy artillery to pistols and everything in-between. This area also includes deployable infrastructure such as tents and generators and of course all the training and support services for the military ground fleet.</li> <li>2. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS</li> <li>b. Wider UK - maritime industry and MOD/OGD establishments</li> <li>c. International – Europe, USA</li> </ol> </li> <li>3. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Light weapons design</li> <li>ii. Military vehicle design</li> <li>iii. Introduction to Explosives</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<p><b>DE&amp;S Project Teams:</b></p> <ul style="list-style-type: none"> <li>• Protected Mobility Team: Mastiff, Jackal</li> <li>• Artillery Systems: AS90, GMLRS</li> <li>• Training and Simulators Team</li> </ul>	<p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• SUPACAT</li> <li>• NP Aerospace</li> <li>• Pearson Engineering</li> </ul>
<b>Example DESG Placements</b>	<p><b>Wider MOD/Military/OGD:</b></p> <ul style="list-style-type: none"> <li>• Land forces Command</li> <li>• Infantry Trials and Development Unit</li> <li>• Combat Support Services</li> <li>• Trials and Development Unit</li> </ul>	<p><b>International</b></p> <ul style="list-style-type: none"> <li>• British Embassy Washington</li> <li>• General Suppliers</li> </ul>

**Name: Oliver**

**Degree: Mechanical Engineering**

During my time on the DESG scheme I have worked in two different DE&S project teams moving on to a key manufacturer and carried out some really exciting trials work with QinetiQ.

The first DE&S team I joined enabled me to get a really good grounding in the work of DE&S and see first hand some issues presented by older equipment and munitions. I really enjoyed familiarising myself with all the different vehicle types and especially the visit to the armory at Shrivenham.

This led me to take a role with the Light Weapons team where I organised a safety panel and a train the trainer course for a new infantry weapon and even got a go at firing the weapon myself. I also helped bring the weapon to service. I also attended the small arms symposium learnt a lot about current and future developments in small arms, armour, and soldier power systems. I had the opportunity to fire a SIG 9mm pistol, a semi automatic shotgun and a 9mm carbine, all things a civilian in the UK would never normally be allowed to do.



I also attended one of the largest vehicle demonstration events in Europe, in the summer and got to play with new vehicle mounted thermal imagers, toured a lot of international vehicle manufactures and got taken for several rides around the test track in the new MAN DROPS truck and the KWV dingo armored personnel carrier. At the end of the day I even got to drive myself around the test track in a Landrover Defender 110 under the expert supervision of an

off road instructor.

One of my ESA courses was the land vehicle demonstration day – this comprised a tour of the facilities of the Defence Support Group (DSG) at Bovington and a play in a fully powered up the Challenger 2 tank, designating targets on the thermal imager then letting the over 10 tonnes of turret swing into place at the touch of a button. That afternoon, we watched a CVR(T) gunner's course take place on nearby ranges then toured the tank museum.

For my next placement I moved out into industry to see how vehicles were designed and built, I helped manage the design, manufacture and acceptance of a new Special Forces vehicle. And had dealings with users, subcontractors, DE&S project team and the wider organization I was seconded to.

They let me fly around their local test track in their demonstrator vehicle, which was amazing fun.

At Qinetiq within their Force Protection Engineering team, I spent 2 weeks in Pendine on an international trial blowing things up, I then helped write a major part of the subsequent report, presented some slides from the trial to the customer and other interested parties, then drafted a paper on the trial. This was a really exciting opportunity to take part in some real life research.



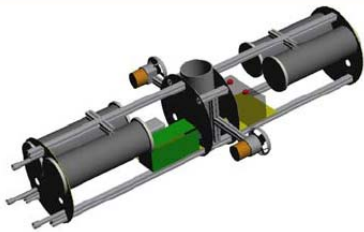
# ESA: MARITIME – NAVAL ARCHITECTURE & MARINE ENGINEERING

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. Maritime NA and ME graduates are involved in bringing into service new ships such as the Queen Elizabeth Class Aircraft Carrier, the Future Submarine Successor and the MARS tanker. Whilst supporting, accepting and trialling the existing fleet.</li> <li>2. NA work on the stability, manoeuvre and control and structures and ME concentrate on the propulsion, power, electrical and mechanical systems. Together with Combat Systems they ensure the continuing success of the Royal Navy and its maritime subsidiaries.</li> <li>3. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS (most likely)</li> <li>b. Portsmouth/Scotland – PDS (alternate)</li> <li>c. Wider UK - maritime industry and MOD/OGD establishments</li> <li>d. International – USA, Australia</li> </ol> </li> <li>4. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. MSc Naval Architecture, 1 year full time at UCL – Naval Architects only</li> <li>ii. Core, Acquisition, Project Management</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Ship Design Course, 3 months full time at UCL</li> <li>ii. Sub Design Course, 3 months full time at UCL</li> <li>iii. MSc Marine Engineering, 1 year full time at UCL – Marine Engineers only</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<b>DE&amp;S Project Teams:</b> <ul style="list-style-type: none"> <li>• Submarines: In-service Submarines, Future Submarines, Dismantling</li> <li>• Ships: Naval Authority Group, MARS production, Type 45, Type 26</li> </ul>	<b>Industry</b> <ul style="list-style-type: none"> <li>• Naval Design Partnership – Concept design</li> <li>• QinetiQ – hydrodynamics group</li> <li>• RNLI – maintenance and operations</li> </ul>
	<b>Wider MOD/Military/OGD:</b> <ul style="list-style-type: none"> <li>• Maritime Commissioning Trials and Acceptance</li> <li>• Dockyard experience – Devonport, Scotland</li> <li>• Sea Time</li> <li>• Salvage and Marine Recovery</li> </ul>	<b>International</b> <ul style="list-style-type: none"> <li>• Centre for Innovation in Ship Design, USA</li> <li>• Australian Submarine Corporation, Australia</li> </ul>

# Name: Matt

## Degree: Naval Architecture

I studied Naval Architecture so the choice of my system anchor was particularly easy, but just because you did not study naval architecture, does not preclude you from this system anchor. The scheme offers a 1 year MSc conversion in the subject for other disciplines.



My first placement was in equipment support at Nuclear Service Support Manager Devonport during this placement I was encouraged to visit and become familiar with many of the Royal Navy Ships and Submarines. I then moved onto research and development at QinetiQ, Haslar. In this placement I was asked to develop a programme to analyse the dead ship tow experiments which were being undertaken in the tow tanks. At the end of the placement I was able to assist in the undertaking of the Landing Platform Dock towing experiments.

My third Placement was in project management at the Directorate of Equipment Capability - Chemical, Biological, Radioactive and Nuclear in main building London where I developed an understanding of policy and was tasked with undertaking the project management plan and updating the risk register.

I then got the opportunity to spend six months working at the Naval Surface Warship Centre – Carderock – Washington DC. During this placement I was tasked with developing a detailed concept design of a Global Fleet Station Ship. I completed this design and it has now been published at the MAST Conference and in the ASNE Journal.



I have now moved into my first professional post where I am responsible for all In-Service Naval Architecture issues for 16 ships. This involves day to day liaison with the ships Executive Officers answering their naval architecture related questions and undertaking certification tasks relating to structures, stability and escape and evacuation.



## **Name: Oliver (Marine Engineering)**

### **Degree: Mechanical Engineering**

My first next placement was in Capital Ships which deals with all the Major shops in the Navy inventory I played a major part in generating refit requirements for two aircraft carriers, this was incredibly challenging but also rewarding and a great way to understand how DE&S works.

I then had the chance to spend six months in Washington DC on secondment to the US Navy's research establishment at Carderock. Carderock is the navy's in-house research base which undertakes design and research for all the new ships they build. The work at Carderock was hugely varied, and included concept designs for high speed SWATH (Small Waterplane Area Twin Hull) transport ships, designing and gaining \$70,000 funding for a remote control model ISO container handler and designing a speed/depth recorder on a very tight timescale for submarine applications. This last project resulted in the start of a process to obtain a patent for the design.

I've also had the opportunity to work with industry to understand how ships are designed, built and tested. This understanding is critical for the work that takes place within DE&S and will provide me with a really good foundation for my future career.

# ESA: MARITIME – COMBAT SYSTEMS

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The Maritime CS ESA is centred on the acquisition and support of new and existing systems. The integration of surveillance, sensors, command and control systems and platform weapons integration to achieve operational effect.</li> <li>2. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS</li> <li>b. Wider UK - maritime industry and MOD/OGD establishments</li> <li>c. International – USA</li> </ol> </li> <li>3. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Maritime Combat Systems, 1 week – Combat Systems only</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<p><b>DE&amp;S Project Teams:</b></p> <ul style="list-style-type: none"> <li>• Submarines: In-service Submarines, Future Submarines</li> <li>• Ships: Combat systems integrations Type 45, Type 26</li> <li>• Combat Systems: Communications and situational awareness, Underwater Electronic Warfare, Weapons systems</li> </ul>	<p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• London Space Agency</li> <li>• BAe Systems – Surface Ships</li> <li>• Atlas Elektronik – Naval research and development</li> </ul>
<b>Example DESG Placements</b>	<p><b>Wider MOD/Military/OGD:</b></p> <ul style="list-style-type: none"> <li>• Dstl – Land Battlespace Systems</li> <li>• UK Missile Defence Centre</li> <li>• Cyber policy and planning</li> </ul>	<p><b>International</b></p> <ul style="list-style-type: none"> <li>• Centre for Innovation in Ship Design, USA</li> </ul>

# **Name: Tim**

## **Degree: Mechatronics**

Maritime Combat Systems is an incredibly broad area, covering almost every platform in the Maritime area resulting in a huge opportunity to get involved in a variety of projects and at every level. This also means that the Combat Systems engineer is continuously faced with changing demands, specifications and requirements.

During my time on the scheme I was able to appreciate the massive amount of work that is undertaken in getting a modern fighting machine from the realisation of a gap in capability to something being rolled out to the front line and into use by UK forces.

In terms of Combat Systems this means weapons and sensor systems, communication systems and general IT. Working out what needs to talk to what, where to send information and where not to and how to connect it all together. In this day and age Combat Systems is one of the most critical and complex area of engineering.

To gain this understanding I spent 3 months training alongside the Royal Navy for one of their office training courses. This is designed to give young Weapon Engineering Officers the technical knowledge they need to run a ship's weapon and sensor systems. This is typical of a DESG course, only open to the Royal Navy or DESG graduates. It focused on learning basic communication, radar and sonar theory then combining it with knowledge of weapons systems to appreciate how a ship fights.

I also got the opportunity to work in the centre of government this opened my eyes to policy, research and a world of emerging technologies. I spent a number of months looking at applications for ideas coming from industry and educational establishments. This used my engineering in different ways, meeting with experts and trying to understand and evaluate a vast range of technologies. Work here can affect projects for decades to come and with that comes working with some very senior people.

# ESA: Weapons Ordnance Munitions and Explosives (WOME)

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. The WOME ESA provides exciting and diverse career opportunities in the field of weapons and ordnance. Graduates will be prepared to take up posts either within the Weapons operating centre or integrated into the wider teams across DE&amp;S to provide specialist advice.</li> <li>2. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS (most likely)</li> <li>b. Wider UK - maritime industry and MOD/OGD establishments</li> <li>c. International – USA, Australia</li> </ol> </li> <li>3. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> <li>ii. Explosives Foundation Course</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Intermediate explosives courses</li> <li>ii. MSc Guided Weapon Systems</li> <li>iii. MSc Explosive Ordnance Engineering</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<b>DE&amp;S Project Teams:</b> <ul style="list-style-type: none"> <li>• Defence Ordnance Safety Group</li> <li>• Weapons Operating Centre</li> <li>• Force Protection project team</li> </ul>	<b>Industry</b> <ul style="list-style-type: none"> <li>• Chemring EOD</li> <li>• Lockheed Martin</li> <li>• Alford Technology</li> </ul>
	<b>Wider MOD/Military/OGD:</b> <ul style="list-style-type: none"> <li>• DSTL</li> <li>• Shrivenham research centre</li> </ul>	<b>International</b> <ul style="list-style-type: none"> <li>• DoD Australia</li> </ul>

**Name: Glen**

**Degree: Mechanical Engineering**

I've been on explosives trials, modelled the break-up of artillery shells on detonation, and calculated safety distances. But the challenge isn't just making things explode - once you've got the chemistry right, that's not difficult. There has recently been increased emphasis on force protection, and in making British troops safe on deployment. I have worked with experts from industry, Dstl and Force Protection team to develop a counter-IED system, taking it from concept, through lab testing and optimisation, to production standard in the course of a six-month placement. I've also worked on a UOR (Urgent Operational Requirements) to protect camps and bases from rocket and mortar fire, working with the contractor to ensure that the capability could be maintained and supported in the harsh conditions of southern Iraq.

I have been lucky to have the opportunity to work on the UK land speed record car, known as Bloodhound SSC. The project plans to smash the current land speed record by achieving speeds of over 1,000mph, but this is not an easy undertaking. These extreme speeds come with many challenges that an engineer must overcome. How do you get a car to over 1,000mph, multiple times, safely and maintain the structural integrity of every component? These are some of the questions that I've been helping to answer.

The most enjoyable project and my biggest achievement have been developing the hybrid rocket system. I have utilised the knowledge I gained during my Explosives Ordnance Engineering MSc to assist the team in moving the rocket program forward. This involved establishing a relationship between Bloodhound and a testing house that will be able to supply training and compatibility testing with high test hydrogen peroxide. In addition, I have helped and will continue to help establish and develop safe working practices for the rocket system. This work has given Bloodhound a responsible and competent image to major suppliers around Europe, opening doors to the supply for the hybrid rocket. It will also allow Bloodhound to carry out rocket test firing with confidence.



**Bloodhound Hybrid Rocket Test Firing**

# ESA: NUCLEAR - WEAPONS (NW) & PROPULSION (NP)

<b>ESA General Information</b>	<ol style="list-style-type: none"> <li>1. NW has a range of exciting and challenging opportunities ranging from operational waterfront support to involvement in cutting edge technical research. With active work to support the acquisition of a new class of SSBN and regeneration of nuclear weapon design capability and overseeing the management of a safe and effective nuclear deterrent.</li> <li>2. NP graduates will be involved in providing cradle-to-grave support of submarine propulsion reactor plants. Developing the scientific and engineering skills to act as intelligent customer to key suppliers and support the responsibility for nuclear safety.</li> <li>3. Locations:             <ol style="list-style-type: none"> <li>a. Bristol – PDS (most likely)</li> <li>b. Portsmouth/Scotland – PDS (alternate)</li> <li>c. Wider UK - maritime industry and MOD/OGD establishments</li> <li>d. International – USA</li> </ol> </li> <li>4. Training Courses:             <ol style="list-style-type: none"> <li>a. Mandatory:                 <ol style="list-style-type: none"> <li>i. Core, Acquisition, Project Management</li> <li>ii. Nuclear Introduction Course, two weeks</li> </ol> </li> <li>b. Potential Opportunities:                 <ol style="list-style-type: none"> <li>i. Nuclear Advance Course, 1 year full time</li> </ol> </li> </ol> </li> </ol>	
<b>Example DESG Placements</b>	<p><b>DE&amp;S Project Teams:</b></p> <ul style="list-style-type: none"> <li>• In-Service Submarines</li> <li>• Strategic Weapons production and management</li> <li>• Trident Nuclear Warhead programme</li> <li>• Submarine Production Team</li> </ul>	<p><b>Industry</b></p> <ul style="list-style-type: none"> <li>• AWE Aldermaston – Nuclear research and development</li> <li>• Lockheed Martin – Special Projects</li> <li>• Rolls-Royce – Reactor design capability</li> </ul>
<b>Example DESG Placements</b>	<p><b>Wider MOD/Military/OGD:</b></p> <ul style="list-style-type: none"> <li>• Joint Capabilities – evaluation and</li> <li>• Directorate Strategic Technology</li> <li>• Defence Nuclear Safety Regulator</li> <li>• Foreign &amp; Commonwealth Office</li> </ul>	<p><b>International</b></p> <ul style="list-style-type: none"> <li>• British Embassy Washington, USA</li> <li>• Future Submarines, USA</li> </ul>

## **Name: Peter (Nuclear Propulsion)**

### **Degree: Electronic Engineering**

My first role at the MOD was a 6 month position in Nuclear Propulsion Project team, the jump into a whole new world of Nuclear Engineering and Project Management and working with the Navy was quite a daunting one but very interesting and enjoyable. I began by working in Equipment Support, building a database for concessions on the current fleet of boats. This meant that I had to get up to scratch with the Nuclear Systems and Navy and was booked to complete the Nuclear Introductory Course at HMS Sultan. With the required knowledge my work became easier and more enjoyable allowing me to gain experience of Long Overhaul Period (Refuel) at HMNB Devonport. While at NP IPT I also gained further experience by visiting industry to see parts of the new boats in build. This allowed me to truly experience and understand the effects of my work, as many of the problems with the boat had been recorded in the database I had previously built.

As well as the equipment support role I took on project management roles by helping organise and co-ordinate our sections office move and also completing a cost analysis for the UK-US exchange programme which is currently being used to shape the future of the Naval Submarine Fleet.

I then joined BAE Systems in Barrow to gain experience with working with MOD suppliers. While at BAE Systems I worked in the Electrical Design team. While there I completed work writing a Communications Training Aid book which was ultimately to be used to train the offices on the Astute Class boats. The best thing about my time at BAE was seeing where all the work I had been doing fitted on to the boat, seeing how my work would affect the user.

## **Name: Judi (Nuclear Weapons)**

### **Degree: Maths with Management**

I have carried out a number of really interesting and involved placements while on the scheme, the first in Systems Assessment, UK Software Facility here, I took on the role of performance and effectiveness assessment. This involved running models and analysing the outputs. This was a great chance to do a technical role rather than a project management oriented placement. There was also the opportunity to travel to the USA twice, once to the Applied Physics Laboratory in Maryland, and once to Cocoa Beach, Florida.

I then moved onto the Strategic Programs Royal Navy, Washington DC and Naval Surface Warfare Centre, Dahlgren Division, Virginia. My task was to liaise with various US contractors in order to produce a generic joint US/UK software delivery schedule. A lot of the software the UK use operationally is provided by the US, and this placement was an excellent opportunity to see the differences between how the US and the UK operate. This was an amazing chance to work with many experts, and learn what they have to offer.

