FIA WOMEN IN MOTORSPORT

ENGINEER YOUR CAREER

A World of Opportunity in Motor Sport

FIA WOMEN IN MOTORSPORT

CONTENTS

WHY IS ENGINEERING IMPORTANT?

- Engineering is the art of applying science, technology and maths to create solutions for human needs to improve the way we live.
- As an engineer, every day is a challenge to innovate and solve problems.
- It influences all aspects of our lives. Without engineering we wouldn't be able to carry out daily tasks (transport, construction, generate and use electricity).
- Engineering disciplines are very diverse. Areas in which you can specialise include Mechanical, Aerospace, Electrical and Civil.

  - **Mechanical engineering** involves the design, production and operation of machinery, and it is one of the oldest and broadest engineering disciplines. It is one of the oldest and broadest of the engineering disciplines. Mechanical engineering is the fundamental discipline for motor sport and automotive engineering. It disrupts and develops mechanical technology to create faster and more efficient vehicles and machinery; including solar and electric powered road cars and bikes, and the fastest cars in Formula One.

  - **Aerospace engineering** is the discipline concerned with the development of aircraft and spacecraft. It is divided into two branches: aeronautical engineering and astronautical engineering or "rocket science". As flight technology became more advanced, everyday air travel became easier and more comfortable. Astronautical engineering may one day make it possible for us to experience space travel.

  - **Electrical engineering** is the discipline of engineering that generally deals with the study and application of electricity, electronics, and electromagnetism. This field includes the development of telephones, electric power distribution, TV broadcasting and recording media. It is what enables us to stay connected virtually via our computers and mobile phones.

  - **Civil engineering** is the discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including structures such as roads, bridges, canals, and buildings. Civil engineering is what built the Pyramids in Egypt, the Great Wall of China, our homes and roads.

WHAT SKILLS DOES AN ENGINEER NEED?

An Engineer requires some of the following attributes:

- **Communication**
- **Curiosity**
- **Creativity**
- **Practicality**
- **Ingenuity**
- **People skills**
- **Imagination**
- **Team work**

It is an Engineer's ability to investigate problems analytically and apply practical experience to create a good solution to a problem.

These attributes are not determined by your gender. Women in engineering are able to help shape the future world for all of us. If there were more women engineers the solutions, creativity and ideas would be more diverse and would further help to make the world a better place.

So if you have any of these attributes, you too could be an Engineer.

Jean Todt, President of the FIA:

"The FIA's membership around the world comprises men and women; each has an identical part to play in sport. Like many international federations, we will support, promote and help advance the participation of women in motor sport to ensure equal opportunities at all levels."

MOTOR SPORT OFFERS A VARIETY OF CAREER OPTIONS IN ENGINEERING

ANA ANDRADE

F1 IN SCHOOLS™ GRADUATE AND STUDENT

NAME
Ana Andrade

STUDIES
F1 in Schools™ Graduate and Physics Student

''MUSTANGS'' – F1 IN SCHOOLS™ - THE FORMULA 1 TECHNOLOGY CHALLENGE

2014

- 2nd place Portuguese Regionals with Identity and Engineering Awards
- 8th place Portuguese National Final

2015

- 1st place Portuguese Regionals, with Identity, Engineering and Verbal Presentation Awards
- 2nd place Portuguese National Final
- Runners-up World Finals in Singapore with Best Enterprise Portfolio Award

EDUCATIONAL PATH

- High School Diploma in Sciences and Technologies with Further Maths, Physics and Chemistry
- Currently studying at King's College London, MSci Physics with Theoretical Physics

FIA WOMEN IN MOTORSPORT

Engineering experience:

Automotive Engineering in the Randstad Williams Engineering Academy.

Placements / first work experience:

I have just completed my first year both at university and at the Randstad Williams Engineering Academy, meaning I am still in the early stages of my engineering career. F1 in Schools gave me valuable skills that led me to my current part-time placement at Autodesk as a Student Expert for Global Strategic Partnerships and Fusion360 Catalyst. Being introduced to 3D modelling during my two years in the competition was certainly one of the advantages of the project, as I have gained crucial experience in several softwares which I am certain will help me in my future career.

AERODYNAMICS ENGINEER JOB DESCRIPTION

Main tasks of the job:

Design, construct and test aircraft or automobiles; conduct basic and applied research to evaluate the adaptability of materials and equipment, and the design and manufacture of the aircraft or automobile.

Why Ana wants to work as an Aerodynamics Engineer:

Aerodynamics Engineering is a way for me to join two passions of mine; physics and engineering. I have always found fluid dynamics one of the most interesting topics in physics and so it would be perfect to be able to apply this knowledge to the real world and make a significant difference in the industry. My preferred position would be to work as an Aerodynamics Engineer within Formula One, as I have been immersed in this environment since joining Williams on the Randstad Engineering Academy. The competitiveness and adrenaline of the sport add extra elements to this position and make it even more exciting.

What Ana really likes about the job:

During my time in F1 in Schools, aerodynamics played a crucial role in the development of our F1 car. Each time we developed a new model, I was always amazed by how such small changes in some parts of the car would improve our CFD (computational fluid dynamics) analysis and save valuable milliseconds on the track. For me, this is the coolest thing in aerodynamics: from an outsider perspective two cars may look identical and yet, if you race them against each other, one would have a clear advantage, and that is because of a better aerodynamic performance. I am a very ambitious and competitive person and so I am always looking to improve. I feel that aerodynamics gives me exactly that - the freedom to push my limits.

How Ana is going to become a Aerodynamics Engineer:

As I am studying a Physics degree full time at King's College London, my career path towards this position might be slightly different for a conventional one. I believe that this is more of an advantage rather than a disadvantage, as I get to develop further knowledge in different fields. The Randstad Williams Engineering Academy was the perfect starting point for me and the bridge I needed between high school and an engineering career. I am hoping to continue in the Academy for a couple more years (hopefully being offered a position at Williams Martini Racing if I survive the competition) and maybe pursue a Masters in Aerospace Engineering later on.

Some disadvantages about being an Aerodynamics Engineer in Formula 1:

Maybe the hardest part of this position for me would be to stay in the factory while the team would be racing!

BERNADETTE COLLINS

SENIOR STRATEGY ENGINEER, SAHARA FORCE INDIA FORMULA ONE TEAM

NAME
Bernadette Collins

JOB TITLE
Senior Strategy Engineer

COMPANY NAME
Sahara Force India Formula One Team

CAREER HIGHLIGHTS

Getting my first job in F1 as a graduate. Receiving the notification that I had been selected for the role was an incredible feeling. It was a very exciting opportunity as well as being a bit nerve-racking.

My first F1 podium in Russia 2015. Helping the team and Sergio 'Checo' Perez to the podium in Russia in 2015 (my first in Formula One) was an incredible feeling and brilliant result for everyone. Thankfully there have been more podiums since then and hopefully more to come, but that one stood out as a brave strategy call that thankfully paid off.

EDUCATIONAL PATH

- A Levels – Mount Lourdes Grammar School – Mathematics, Physics and Design and Technology.
- MEng Mechanical and Manufacturing Engineering – Queens University Belfast.

"Always pushing for that extra little bit!

What do you love about your job:

I really enjoy working within F1 as I enjoy the pace of everything that we do. From the limited time in each session to the pace of the car and people development. Even within my short career I have changed job many times, which shows how quickly things can happen and people move around. I enjoy the excitement of being at the track and the pressure and adrenaline to achieve the best possible result for the team. The race starts are still very exciting as I watch them on TV from the garage and at that point you cannot do anything except watch with the added benefit of being able to hear the engines rev up in real life in the background. After that, there is a run to the pit wall where the work that I can influence starts; that actually feels a lot calmer.

What advice would you give to students considering a motor sport career:

Experience is essential in any engineering job and motor sport is no different. It is key to try and figure out if you enjoy being at the track or being in the factory designing different bits of the car, or if data analysis and simulators is more your thing. The more time you can spend in different areas or trying different things, the more you will learn. I spent a lot of time in other series volunteering for a team to help at the track, which gave me some useful experience and it was really enjoyable. There are so many roles for so many skill sets that it's about finding the one (or several in my case) that you want to try and work towards.

SENIOR STRATEGY ENGINEER JOB DESCRIPTION

Skills:

Communication, data analysis, situation awareness, ability to work under pressure, understanding weather radar.

Responsibilities:

Pre-event strategy planning and tyre selections – before a race weekend tyres must be selected and a plan formed regarding weekend run plans and the testing on Friday that is to be completed. I work to provide the most accurate information possible for the likely strategies and tyres required to gain the most team championship points in the race.

Race day strategy – Throughout the race weekend, continuously evolving conditions and reaction to competitors, require calls on pit stop and strategy that do not follow the pre-determined plan. This includes when to stop the car and which tyres to fit, as well as pace management and traffic information. Condition changes include anything from rain to safety cars. The single target is to achieve the maximum championship points possible for the team at each event.

Post event strategy review – After the race event a full review of the planned strategy versus the strategy completed is undertaken. This analyses all of the major decision points both for Force India and for our competitors in order to learn and maximise the team's result in the future.

Career Progression:

I have possibly had a very unusual career progression to this point but hopefully that proves the opportunities available within motor sport.

Graduate Engineer – McLaren Racing – Worked in various departments to gain experience.

Design Engineer – McLaren Racing – Worked in the design office mainly within the transmission group but also spent some time in engine systems, suspension and bodywork.

Race Engineer – GT3 – Worked in my spare time to gain valuable trackside experience with customer GT3 teams in a variety of series.

Performance Engineer – McLaren Racing – Spent the 2014 season travelling with the team as performance engineer on Jenson Button's car.

Strategy Engineer – Sahara Force India – Travelling since mid-2015 in strategy role.

Benefits of being a Strategy Engineer:

Influence – I enjoy having a direct effect on the race result.

Travelling – Although very busy and sometimes tiring, I enjoy travelling the world with the team.

Learning – I enjoy continuously learning new things and every day there is a new challenge.

Team work – Race teams operate very much as a team with everyone contributing, which is a good environment to work in.

Challenges of being a Strategy Engineer:

Hindsight – It's very easy to realise exactly what you should have done afterwards.

Pressure – You realise that a single decision could win or lose points and effect the result for the entire team!

Early mornings – I'm not amazing at getting up and early mornings at the track are painful.

LEENA GADE

TECHNICAL MANAGER CUSTOMER RACING, BENTLEY MOTORSPORT

NAME
Leena Gade

JOB TITLE
Technical Manager Customer Racing

COMPANY NAME
Bentley Motorsport

CAREER HIGHLIGHTS

As Race Engineer with Audi Sport Team Joest, LMP1 Sportscar and Endurance Racing

- Three time overall winner at Le Mans as Race Engineer in 2011, 2012 and 2014, and one win as Assistant Race Engineer in 2008.
- Winner of the inaugural FIA World Endurance Championship drivers' and manufacturers' championships in 2012.
- Winner of American Le Mans Series LMP1 Championship and Drivers' Championship in 2007 and 2008 as Assistant Engineer.
- Race Engineer since September 2010 for 40 races with 13 race wins.

Race Engineer – Audi Sport Team Joest

Lead Engineer for the racecar tasked with coordinating support engineers, mechanics and drivers to maximise the team and car's performance during a race weekend. Coordinating race strategy and performance on race day.

TECHNICAL MANAGER JOB DESCRIPTION

Technical Manager for Customer Racing – Bentley Motorsport GT3 Continental

- Technical Leadership and Chief Engineer function for customer racing programmes, transferring car set up guidance, performance parameters, technical issues and updates from the works team test and development programme.
- Responsibility for Strategy Engineering with customer and works team race programmes in ADAC GT Masters and Blancpain Endurance Racing Series.
- Timing analysis with customer team for performance versus competition and validation of set up options and Balance of Performance results.
- Guidance and development for current race car and future GT3 project, focussing on car performance and race tools, race team adaption for various series, supporting development engineers and suppliers with direction, planning and priority objectives.
- Representation for Bentley Motorsport as a manufacturer at Race Series meetings in sporting and technical discussions.
- Motorsport Department defining future strategy.
- Evaluating driver and team options for current and future programmes.
- Development into future management roles within the Bentley Motorsport organisation
- Ambassador for Bentley Motorsport

Leena Gade continued:

AWARDS

FIA Women in Motorsport Ambassador for Engineering
September 2014 to Date

To promote engineering to young, aspiring, female engineers in motor sport.

Man of the Year Award
FIA WEC
December 2012

Annual award given to individual working in the World Endurance Championship, recognising their achievements during the season.

Man of the Year 2012
Top Gear Magazine, BBC
December 2012

Top Gear's December 2012 awards issue listed individuals who had gone faster, further, higher and harder in the automotive world. Also listed that year, were Sir Ranulph Fiennes, Felix Baumgartner, Stefano Domenicali, Sir Chris Hoy, Professor Sid Watkins, Robert Kubica, Alex Zanardi, Ratan Tata, Ian Callum and Martin Winterkorn.

Woman in Technology Award 2012
C & R Racing Incorporated - Women in the Winner's Circle Foundation
December 2012

Awarded by the Winner's Circle Foundation for successful international motor sport participation as Race Engineer in the inaugural FIA WEC series in 2012.

Honorary Fellowship of Myerscough College
Myerscough College
July 2015

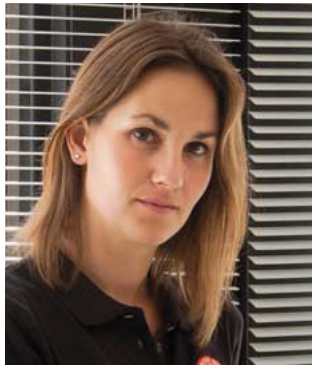
Honorary Fellowship awarded by Myerscough College in recognition of my career and contribution to the motor sport industry.

Lord Wakefield Trophy - Achievements in Motorsport
British Women Racing Drivers' Club
January 2016

Award to honour commitment and achievements in the field of motor sport.

DELPHINE BISCAYE

MECHANICAL ENGINEER. PROJECT & TEAM MANAGER, VENTURI FORMULA E TEAM



NAME
Delphine Biscaye

JOB TITLE
Mechanical Engineer. Project & Team Manager

COMPANY NAME
Venturi

CAREER HIGHLIGHTS

FIA Land Speed Record. New FIA land speed record in the electric vehicle category (over 3500kg) achieved in August 2015 with a new 3000 hp battery-powered streamliner, Venturi-VBB3, designed and built with the Ohio State University (OSU).

Responsible for the design and integration of the powertrain, as well as the project management and coordination between Venturi and the OSU.

FIA Formula E Championship. First podium of the season (2nd place) for my first race as Team Manager for Venturi Formula E Team – Long Beach 2016.

EDUCATIONAL PATH

- Scientific bachelor, "classes préparatoires" math & physics (2 years)
- Mechanical engineering Master degree (5 years) – IFMA, Clermont-Ferrand, France
- 1st Prize of the Foundation of the IFMA Engineering School

Being an engineer in motor sport is a challenging way to combine work and passion!

Placement / Work Experience Highlights:

I completed three six-month work placements during two years:

1. Canterbury University (Christchurch, New Zealand) as post-doctorate assistant: test bench and parts design for a new rapid prototyping solution.
2. I have worked twice for Williams F1 (Grove, UK) as Research & Development Engineer in the Kinetic Energy Recovery System (KERS) Department. Design and testing of a new cooling system for the KERS electric motor.

What do you love about your job:

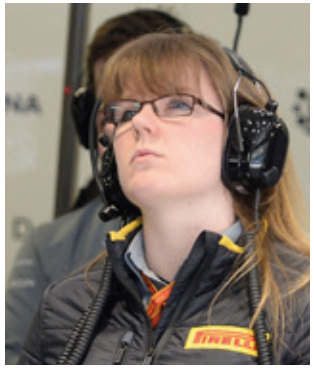
As Team Manager, my job is the perfect combination between technology, organisation and communication. It also allows me to work with very experienced engineers and mechanics and to learn a bit more every day.

What advice would you give to students considering a motor sport career:

The most important thing is to orientate your educational path to motor sport as early as possible and maximise your experience with placements, school projects and associated work. Choose a University known for its strong links with motor sport teams and fields, or for the quality and diversity of the motor sport associations and challenges it offers to its students.

GEMMA HATTON

FORMULA ONE TRACKSIDE TYRE ENGINEER, PIRELLI TYRE S.p.A



NAME
Gemma Hatton

JOB TITLE
Formula One Trackside Tyre Engineer

COMPANY NAME
Pirelli Tyre S.p.A

PLACEMENTS / FIRST WORK EXPERIENCE

I started writing motor sport technology articles for Racecar Engineering to learn about new subjects and grow my network of contacts. I completed a placement at Nissan Automotive in the Performance department, which recommended me to a Nissan team that raced in the Blancpain GT Championship where I worked at the Silverstone 6 Hour and Spa 24 Hour races. Due to the contacts made, I then got an opportunity to work in a British Touring Car Championship team as a Data Engineer in 2015 and also worked for a simulator company and completed my thesis on F1 Strategy at the Lotus F1 Team.

EDUCATIONAL PATH

- Four A Levels in Maths, Physics, Design and Technology and Geography
- Bachelor of Engineering: Mechanical Engineering with Automotive and Placement, University of Bath.
- Masters of Engineering: Advanced Motorsport Engineering, Cranfield University

Gemma's work as a tyre Engineer:

The perfect balance between analysing data and practical work. It is also satisfying helping the team to understand tyre characteristics and behaviour and is highly interesting as you get an insight into how other teams utilise their tyres as well.

Gemma's best memory to date is:

Standing on the F1 grid of every race – no matter how many times I do it, I simply cannot believe that I have actually made it, after spending so many years watching it on TV.

What do you really like about your job:

Race day, as it is such a high-pressured environment and the team needs live wear checks to help with their strategy decisions so we have to work fast!

Gemma's advice to young engineers:

Never give up. And once you've decided on your goal – attack it from all possible angles. Writing articles was not necessarily developing my engineering experience, but is definitely what got me into some race teams, so try and be clever with where you apply your effort and time. Always do a little bit extra, whatever the task and be enthusiastic – this will make a good impression which is invaluable in the small world that is motor sport.

TYRE ENGINEER JOB DESCRIPTION

During a race, one of the most important aspects is how drivers manage their tyres to try and utilise their performance in accordance with their strategy. Therefore, we physically collect data from the tyres through wear checks and visuals and combine this with live telemetry, driver feedback and pit lane averages to conclude with the team how they are using their tyres, and how their performance can be improved.

Each team has a Pirelli engineer, and at the end of each day we combine our findings to generate average values and overall comments – this is the only time that teams can get a comparison between their performance relative to the performance of other teams

The qualities required to be a tyre Engineer:

The ability to piece together all the bits of information to generate overall relevant feedback to the teams in a concise manner.

The confidence to walk into meeting rooms with team principals and drivers and use good communication to get your points across.

Discipline – if a job needs doing regardless of the time, how long it will take or how you are feeling, it has to be done.

What is interesting about this job:

Tyres. They're actually fascinating because their properties means that their behaviour evolves during a race and different driving styles make them degrade at a different rate or in a different way so every race you are always learning something new. Also working as a team – you have to work with your Pirelli fitter, the team's wheelmen, the team's engineers as well as the other Pirelli trackside engineers together to try and understand what's happening on that particular day, in those particular conditions.

Any disadvantages / difficulties with this job:

It still can be quite intimidating being a women in the pit lane, however once you've proved yourself, you gain respect like any other engineer.

The travel makes it difficult to have friends, be there for your family and also means when you are home you're usually exhausted. Also when airlines lose your luggage and you're the only girl on the team borrowing clothes can be tricky!

Possibilities of career progression:

Becoming a recognised Tyre Engineer in the pit lane, either for the tyre supplier or a team. Tyres are extremely difficult to quantify and understand so if you can grasp it with years of experience then you can become very valuable to a team and can make a real difference.

CRISTIANA PACE

RESEARCH CONSULTANT, FIA

NAME
Cristiana Pace

JOB TITLE
Research Consultant, FIA

COMPANY NAME
FIA
PhD CANDIDATE
CBiS, Coventry University

CAREER HIGHLIGHTS

- Having worked as a strategy Engineer at Le Mans with an Italian Team and finished the race, although in sixth position!
- In my first year as performance and strategy engineer, we won the FIA GT championship and second place in the N-GT with JMB Team
- Working in F1 trackside as a data analyst for the FIA from 2004-2009.

PLACEMENT / WORK EXPERIENCE HIGHLIGHTS:

- Track engineer, senior track engineer, group leader, customer leader, EM Motorsport, Oxford, UK contracted to the FIA as Data Analyst and later as Product development manager.
- Head of sales and Business development, EM Motorsport, Oxford UK.
- Business Development Manager, Motorsport Programmes at Williams Advanced Engineering (within Williams F1), Grove, UK.
- Research Consultant, FIA Safety Department.

EDUCATIONAL PATH

- Mechanical and Management Engineer (five year Masters) Universita' di Bologna, Bologna, Italy
- Master (MSc) in Motorsport Engineering and Management, Cranfield University, UK
- PhD in Business and Strategic Management (ongoing), Coventry University, UK

What do you love about your job:

Thinking it will make a difference to future generations working in motor sport, as well as solving technology challenges and holding discussions with suppliers, teams and colleagues regarding technology developments and how to implement them.

What advice would you give to students considering a motor sport career:

Never give up! I wanted to be an engineer from the age of eight but I was told that women cannot be engineers, never mind one in motor sport! Clearly this is not true!

Persevere and be prepared to work hard. Hard work always pays off. Try to gain practical experience, join your national ASN to become a scrutineer (I did), write articles for the national ASN's magazine (I use to do this for the MSA magazine back in 2003!), go to races, and conferences.

Motivational Quotes:

'Shoot for the moon. Even if you miss, you'll land among the stars.' *(N. Peale)*

'The world is changing and as the sporting flagship of motor sport (the FIA) we have a responsibility to keep up with those changes' *(J. Todt, 2014).*

RESEARCH CONSULTANT JOB DESCRIPTION

Skills:

Communication, data analysis, ability to work as part of a team or independently, ability to work under pressure, new technology awareness, control system and electronic knowledge.

Responsibilities:

- Test equipment to be introduced into FIA championships (crash tests, vibration tests and also track tests).
- Liaise with teams to validate installation and to support the deployment of new and existing safety equipment in FIA Championships.
- Work closely with the Global Institute team in order to define and produce documents such as a safety road map (strategy for the introduction of safety equipment into championship), and technical specifications for safety devices, etc.

Career Progression:

Motor sport is full of opportunities if you can show people you have the right skills.

I started as a scrutineer for my local ASN (CSAI) and through this experience, I gained the opportunity to undertake placements.

Minardi F1 Team: Here I studied the organisation and the way F1 teams generate revenue in the marketing department.

Oral engineering (owned by Forghieri ex-Ferrari F1) designing a variable intake for a two cylinder engine.

All were very different experiences but they allowed me to understand what area of motor sport I wanted to be involved in: motor sport engineering.

My first part time job was as technical assistant to the CSAI technical delegate for Euro 3000 and my final university final project was about the F3000 chassis and its gearbox problems!

As a freelance engineer I have the opportunity to work with very talented teams and drivers. Then I joined EM Motorsport, in 2004, working in Formula One, subcontracted to the FIA to monitor traction control. During those years, I progressed from engineer to group leader and then to customer leader, looking after the development and implantation of the Surveillance Data Recorder (SDR), the marshalling system and the electronic flags. All of these ideas were born over dinner and are now well-established in motor sport.

Career progression continued:

Head of sales and business development for a technology company was also a very interesting job, that focused on business strategies and differentiation. This led me to join Williams F1, first in the capacity of a business development engineer working on the motor sport programme for its Qatari operations and then as a business development manager, working on the motor sport programmes at Williams Advanced Engineering. I had the pleasure to work directly with a very talented and well known individual, gaining a very good insight into in technologies and engineering.

This varied career is now allowing me to consult for the FIA safety department and the desire for knowledge that led my path is motivating my choice to undertake a PhD.

Benefits of being a Research Consultant:

Making a difference – I enjoy thinking that all these years in developing and installing safety devices has made a real difference to motor sport.

Travelling – I enjoy travelling with different championships. This year I went to a desert rally for the first time in my life and it was very enlightening.

Learning – I enjoy continuously learning new things and being in contact with very experienced people.

Family time – I have a young family (3 kids all under 8) and long days and travelling away is becoming very challenging logistically. It is possible thanks to my other half and family and friends, but I need to be very organised!

KATHRYN RICHARDS

WIND TUNNEL TEST TECHNICIAN MERCEDES AMG PETRONAS FORMULA ONE TEAM

NAME
Kathryn Richards

JOB TITLE
Wind Tunnel Test Technician

COMPANY NAME
Mercedes AMG Petronas Formula One Team

CAREER HIGHLIGHTS

I have been working for the team (under its various different names) for 10 years. I have an Higher National Diploma in Aerospace Studies and a First class degree in Aerospace Engineering (Farnborough College of Technology/University of Surrey). I also have a PhD in vehicle aerodynamics (University of Nottingham). My primary responsibilities are to ensure the wind tunnel runs smoothly and efficiently so that the aerodynamicists can develop and improve the performance of the race car. My duties also include monitoring and reporting on the performance and health of the wind tunnel itself, so it always remains in tip-top condition.

I feel immensely proud and fortunate to work as part of such an amazing team of people, all of whom share the ambition to win and desire to become world champions again.

WHAT TO STUDY TO BECOME A MOTOR SPORT ENGINEER?

Engineering degrees and apprenticeships come in all shapes and sizes and can lead to all sorts of jobs in motor sport. These roles need people with different skills, strengths and personalities.

It's okay to have no idea what you want to be while you are at school. As you can see, engineering gives you access to many different opportunities.

Keep your options open at school
Choose maths, another science and something you enjoy to study at high school.

Make sure you research your options
Go to lots of career talks, fairs or open days all throughout your time at school and talk to people in motor sport about their work and career path.

Apply to do a year in industry

Find the chance to work alongside engineers in a motor sport team or organisation and find out what they really do.

Choose your favourite area to study

There is a lot of choice when deciding what to study in higher education. There are few motor sport specific colleges and university courses available. However, a scientific or engineering course is as valuable when developing your knowledge within your chosen subject.

Which area interests you most?

Aerodynamics, mechanics, electronics, simulation - all of these specialities are needed in motor sport. The best one for you is the one you will be the most motivated to work in.

Which drivers or teams do you like to watch

Motor sport itself is a multi-discipline sport with opportunities in different types of competition. Engineers are needed at all levels and formats of motor sport from national championships to international series. Use social media to find out if you are interested in working with bike, car or truck teams. Do you like the precision of Formula One, the adventure of rallying, the thrill of superbikes or the diversity of sportscar racing?

HOW CAN YOU GET VALUABLE WORK EXPERIENCE?

During your studies

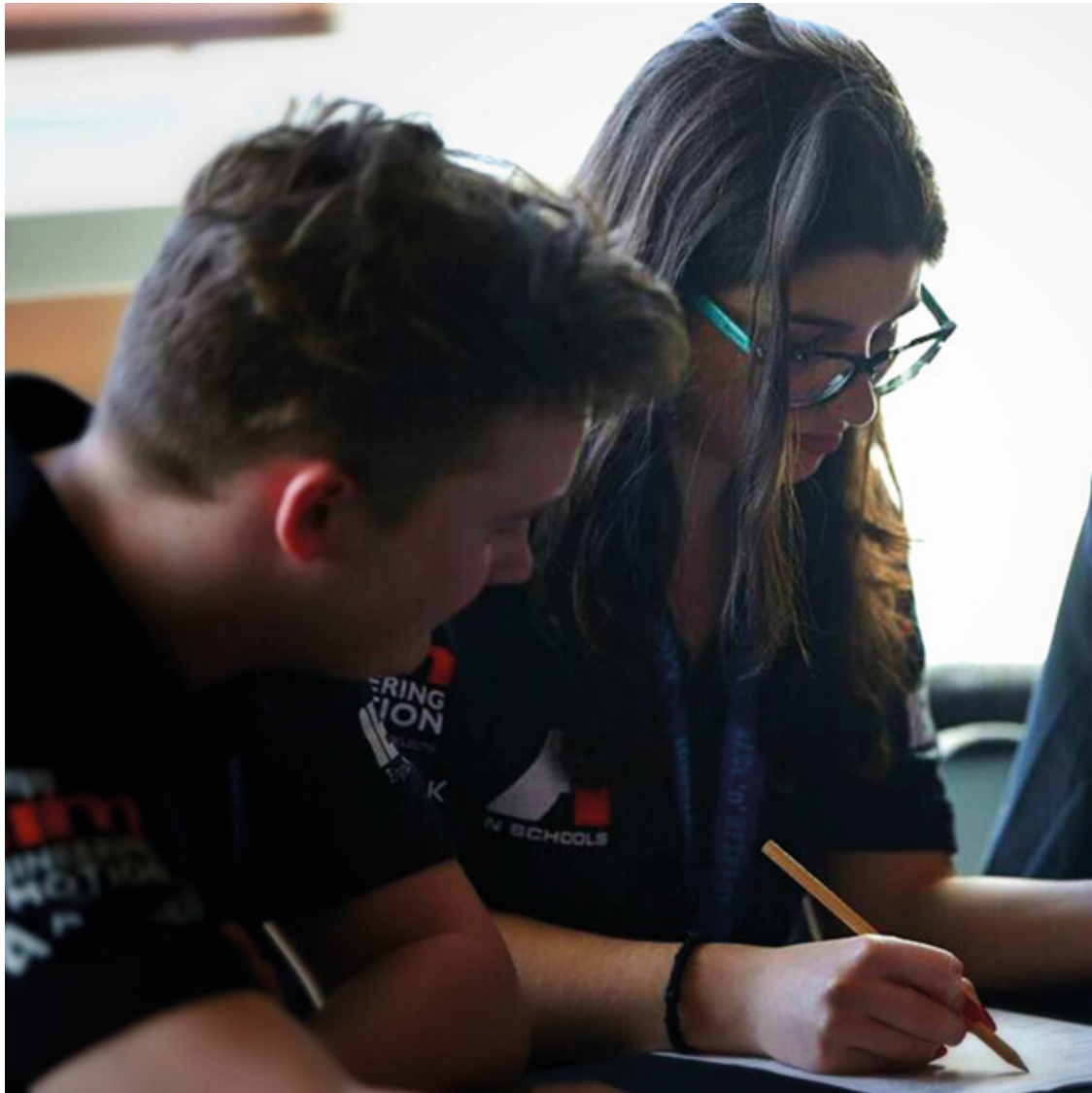
Maximise your chance to work in motor sport by starting your work experience during your studies.

Placements are the best way to learn about your future job and make contacts for future employment: make the finding of a placement in a motor sport team or company a priority.

Placements are limited with race teams, so if you don't find one, try their suppliers, motor sport organisations and clubs. Alternatively a placement in the automotive industry will be just as valuable.

If you live near a race track, or a race event is happening locally, go along and speak to the organiser of the event or a competing team and volunteer to get involved – you may end up washing wheels, sweeping the garage or just making the tea, but you could meet your future employer there.

Read motor sport publications and follow their social media channels such as FIA AUTO+, FIA AUTO+ Women in Motor Sport Newsletter, AUTOSPORT, Race Car Engineering, Race Tech, and get to know the business you plan to be involved in. You will also find names and addresses of companies looking to recruit.



There are many programmes which can give you relevant motor sport experience, and will help you to find the area of engineering that you enjoy.

F1 IN SCHOOLS™ – THE FORMULA 1 TECHNOLOGY CHALLENGE

F1 in Schools, **the Formula 1 Technology Challenge**, is a multi-discipline STEM (Science, Technology, Engineering, Maths) educational initiative, that not only offers students an engaging and exciting engineering-based learning experience, it also gives participants a head start on a career path for motor sport, Formula 1 and allied engineering industries.

F1 in Schools challenges **students to create their own Formula 1** team which is commissioned to design, construct and race the fastest miniature Formula 1 Car of the Future; a 21cm long scale model built from a modelling block and powered by a compressed air cylinder. Each team of between three and six students creates a 'pit' display and showcases their work in developing their race car, with a verbal and written presentation for the judges. The teams then race their model cars on a specially designed 20 metre test track, with the cars covering the distance in around one second.

The programme operates in **over 40 countries worldwide**, with regional and national competitions rewarding the students with trophies and prizes at each level. National winners are invited to compete at the prestigious F1 in Schools World Finals, which take place annually alongside a Formula 1 Grand Prix. These students compete for the coveted Bernie Ecclestone F1 in Schools World Champions trophy, and highly-valued City University London and University College London Engineering scholarships. Also there is the opportunity to win the FIA Women in Motorsport Trophy, which recognises exceptional female talent competing at the World Finals.

F1 in Schools 'alumni' have benefited from participating with the competition assisting them in securing job interviews and opening doors to Formula 1 teams. Former F1 in Schools students have gained employment at a number of F1 teams including McLaren, Williams and Red Bull, as well as suppliers such as Mercedes Benz High Performance Engines.

Students and schools interested in taking on the challenge can find out more at **www.f1inschools.com**. Follow all the news from F1 in Schools on **Facebook**, **Twitter** and **Instagram**.

FORMULA STUDENT is an educational motor sport competition.

Backed by industry and high profile engineers, the competition aims to inspire and develop enterprising and innovative young engineers. Universities from across the globe are challenged to **design and build a single-seat racing car** in order to compete in static and dynamic events, which demonstrate their understanding and test the performance of the vehicle. There are 13 Formula Student competitions around the world, perhaps there is one you can visit to take a look.

FORMULA STUDENT WORLD COMPETITIONS

COMPETITION	FOR MORE INFORMATION GO TO THEIR WEBSITE
Formula SAE® Australasia	http://www.saea.com.au/formula-sae-a
Formula Student Austria	http://www.fsaustria.at
Fórmula SAE® Brasil	http://portal.saebrasil.org.br/programas-estudantis/formula-sae-brasil
Formula North – Canada	http://formulanorth.com
Formula Student Czech Republic	http://www.fsczech.cz
Formula Student Germany	http://www.formulastudent.de
Formula Student Hungary	http://fshungary.hu
Formula SAE® Italy	http://www.ata.it/content/formula-ata/
Student Formula Japan	http://www.jsae.or.jp/formula/en/
Formula Student Spain	http://www.formulastudent.es
Formula Student United Kingdom	http://www.formulastudent.com
Formula SAE® Michigan	http://students.sae.org/competitions/formulaseries/fsae/
Formula SAE® Lincoln	http://students.sae.org/competitions/formulaseries/west/

Shell Eco-marathon is a unique competition that challenges students around the world to design, build and drive the most energy-efficient car. With three annual events in Asia, Americas and Europe, student teams take to the track to see who goes further on the least amount of fuel.

www.shell.com/energy-and-innovation/shell-ecomarathon.html

The World Solar Challenge is a biennial solar-powered car race which covers 3,022 km (1,878 miles) through the Australian Outback from Darwin, Northern Territory to Adelaide, South Australia. The race attracts teams from around the world, most of which are fielded by universities or corporations although some are fielded by high schools. **www.worldsolarchallenge.org**

THE WILLIAMS "SPARK" CSR PROGRAMME: EDUCATION INITIATIVES

THE AUTOSPORT WILLIAMS ENGINEER OF THE FUTURE AWARD

Williams teamed up with AUTOSPORT to create an annual award that names an engineering student from a UK university as a rising star of Formula One engineering and supports them with an accelerated career development programme.

The AUTOSPORT Williams Engineer of the Future Award is presented in December each year at the annual Autosport Awards dinner, with the first award presented in December 2015 to Oxford University student Elizabeth Thompson. A joint Williams and AUTOSPORT judging panel selects the winner each year from a list of nominees provided by eight of the country's leading universities with strong track records in engineering: Oxford, Cambridge, Imperial, Loughborough, Bath, Southampton, Oxford Brookes and Queens University, Belfast.

The nominees are assessed on their previous academic track record and a proven passion for motor sport. Following a written essay question and a series of assessments at the Williams factory in Oxfordshire, the eventual winner is offered an initial two-year placement upon graduation in an accelerated development programme that sees them mentored by senior engineers and rotated through various areas of the team before they find their specialism. During the placement they will also get the unique opportunity to work in the team's race operations division and gain experience at a Grand Prix.

THE RANDSTAD WILLIAMS ENGINEERING ACADEMY

In 2015, Williams kicked off a new Engineering Academy in partnership with Randstad, the second largest HR services provider in the world. The Randstad Williams Engineering Academy will see Williams mentor up to 10 students each year in a long term extra-curricular programme that will help guide a new generation of engineers towards a successful career in Formula One.

To select the best candidates, Williams has partnered with F1 in Schools, a not-for-profit educational organisation that delivers a world-class STEM competition that engages with millions of students across the globe. The Academy is open to those aged between 16 and 18 at the time of entry and have successfully made it through to that year's F1 in Schools World Finals.

The first cohort of students joined the Academy in October 2015 and represented six different countries from around the world. Over the course of the next seven years each cohort of students will be gradually whittled down in number as they complete a series of vocational placements and mentoring experiences at Williams, and undertake e-learning projects that have been created in collaboration with Cambridge

University Press. The aim of the programme is to offer full time employment at Williams for those who remain on the Academy for its duration, following the completion of their higher education.

APPRENTICESHIPS

Formula One is often perceived as an exclusive sport that lacks accessibility. Williams is trying to reverse this image by offering a range of apprenticeship, work experience and student placement programmes that are helping young people from a wide range of backgrounds enter Formula One.

Exciting apprenticeship opportunities are available at the team's headquarters in Grove, Oxfordshire each year. As part of the programme apprentices will, in addition to attending College, rotate throughout the metallic and composite production areas of the business. Within a fast moving environment of diverse technical challenges, they will learn to interpret technical drawings and use a variety of materials and techniques, and will therefore develop a good range of hand crafting skills, as well as the ability to measure and fit components accurately. Ultimately, they will progress through the apprenticeship to take up roles within the composites and model shop departments.

INDUSTRIAL PLACEMENTS

Williams employs a number of university students on 12-month industrial placements each year. Students will work under the mentorship of an experienced team member, gaining significant experience, as well as invaluable information for final year dissertations or thesis. Along the way students will pick up a diverse range of new skills and competencies that can be universally applied in an environment that is constantly changing. Williams accept placement students in its aerodynamics department, design office, test facilities, and its advanced engineering division. Typically Williams advertises these vacancies during the first University term the year before the industrial placement.

TASTER WEEK

Williams' "Taster Week - Five Days in the Life of Williams" is designed to provide an insight into the diverse range of skills and occupations required to produce a Formula One racing car. This programme takes place at the end of July each year and is aimed at secondary school students based in the UK. This fully immersive programme allows the students to visit every department across the company and receive seminars by Williams' senior personnel, and in many departments get hands on with the production of a Formula One car.

WHO CAN YOU ASK FOR ADVICE?

If you are thinking about engineering as a career but want to find out if it's right for you, there are great societies that can give you insight into what engineering and motor sport is about. Here are some links to those societies, some of which are just for girls:

Fédération Internationale de l'Automobile (FIA): "The FIA Women in Motor Sport Commission aims to create a sports culture which facilitates and values the full participation of women in all aspects of motor sport." Michèle Mouton, President of the Women in Motor Sport Commission. **www.fia.com/fia-women-motorsport**

The FIA membership is comprised to over 235 motoring and motor sport club members in more than 140 countries. There is likely to be a local motor sport club in your country, contact them and see what events and advice they have to offer.

Dare to be Different: Susie Wolff – FIA Women in Motorsport Ambassador - and the Motor Sports Association, the governing body of UK motor sport, have joined forces to launch Dare To Be Different, a high-profile new initiative that will inspire, connect and celebrate women who work in every aspect of motor sport. **www.daretobedifferent.org**

Women's Engineering Society: Inspiring women as engineers, scientists and technical leaders. **www.wes.org.uk**

WISE Campaign: inspires women and girls to pursue science, technology, engineering and mathematics (STEM) as pathways to exciting and fulfilling careers, with useful resources for students. **www.wisecampaign.org.uk**

Engineer Girl: A website detailing the exciting opportunities that engineering represents for girls and women. **www.engineergirl.wes.org.uk**

Tomorrow's Engineers: Information and resources about the amazing careers available in engineering. **www.tomorrowengineers.org.uk**

The Motorsport Industry Association: The Motorsport Industry Association (MIA) is a leading motor sport association, performance engineering, services and tuning sectors.

The MIA represents the specialised needs of this highly-successful global industry as it undergoes continuing rapid development throughout the world. **www.the-mia.com**

SUCCESS – YOUR FIRST JOB IN MOTOR SPORT

It is key to be willing to say yes to opportunities that are presented to you. All the experience you gain will help you to become a more professional, competent and successful engineer.

Graduate Schemes

Some companies offer graduate programmes for young engineers: they select a few recently-graduated engineers and introduce them to the different departments of their company. During this process you will be assessed on your skills for a role with this organisation. Often there is a job opportunity at the end, and if not, this experience will always be beneficial for you to apply in other teams or motor sport organisations. Most of the Formula One teams offer graduate placements, you can apply for these directly via their websites.

Starting somewhere....

Some engineering positions require a lot of experience and knowledge, and these are usually not accessible immediately to university graduates. Be prepared that you may need to start by working in the factory or design office rather than at races, to get more experience and show your motivation. In time, this could give you the opportunity to take on your desired role.

Take advantage of short-term contracts: like placements, they can be a good way to enter a company, develop your skills, make new contacts and most importantly show your capabilities.

As you can see from the profiles of our engineers there is always a possibility of career evolution and change. You can go from junior engineer to senior engineer, head of an engineering department, chief engineer, or even technical director. Ultimately, the choice is always yours.

Remember that motor sport is a small world: if you are competent, passionate and hard working, you will be able to grow in your company or in one of its competitors.

Good Luck!

With thanks to our contributors and supporters

FIA Women in Motorsport Commission

Editor – Fiona Pawley
Contributors – Delphine Biscaye, Leena Gade