



Engineering Technical Report
Workshop & Practise ACHA4011

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Abbreviations	
UWTSD	University of Wales Trinity Saint David
PPE	Personal Protective Equipment
IMechE	Institute of Mechanical engineers

1 Introduction

In this report five different topics will be covered and/or discussed, each topic will focus on key aspects of engineering: Health & Safety, engineer's role in society, problem solving, team structure and to finish a personal development plan.

This report begins with analysing the health and safety ideals regarding a lathe, more specifically the lathe located in the machine shop in UWTSD IQ Campus, highlighting the safety protocols and the legislation that led to the safety protocols being put in place with an up to date risk assessment.

Next the role of an engineer in society is discussed highlighting the importance of sustainability in today's society as it has started to become a top priority for many companies around the world. The Codes of Conducts of two institutions/companies will be analysed and compared to provide an insight into the value of sustainability.

The problem solving section will show how engineers methodically have to figure out a solution to a problem. A flow chart will be used to demonstrate this accordingly.

Team Structure is very important to groups of engineers and the UWTSD Motorsport team structure will be analysed to see if the structure is well supported and how it could be improved.

The final section will include a personal development plan for my future plans and aspirations.

Academic sources will be used and referenced accordingly due to the Harvard style.

2.1 PPE & Risks associated with the lathe

Moving on to the correct PPE needed, there is much that needs to be considered; Swarf can be created in abundance while using a lathe this creates a risk of getting cuts on any uncovered skin as well as getting swarf in your eyes but also a swarf build up can interfere with your work on the lathe itself. Having long hair also creates a risk of it getting caught in the lathe while in use. The pieces that are being worked on and the tools used can get quite hot while being in use for a longer period of time. The tools used such as a cutting tool are very sharp and can cause risk for serious cuts and lacerations to any unprotected parts of the body. (Cornell University, Undated)

2.2 Minimizing Risk

There are multiple solutions to all the risks mentioned above; firstly, eye protection must always be worn when using/operating a lathe but also when near a lathe in use as due to the high rpm of the lathe swarf and any object that comes into contact with the lathe can be launched in a direction toward the face and body. This also means wearing protective clothing and safety footwear at all times. Longer hair must always be tied back and secured into the collar of your protective clothing to ensure it will not get caught in the rotating parts of the lathe.

2.3 Risk Assessment

Risk assessments have now become essential in almost every aspect of life especially in the workplace dating back to 1974 with the Health & Safety Act being introduced by the UK Government. Although the need of an actual risk assessment was not required until 1992 even though the foundations were laid in 1974 (Löfstedt, R.E, 1997). UWTSD follow a risk assessment matrix as seen below in Table 2-1

Table 2-1: UWTSD Risk Assessment Matrix (UWTSD, 2024)

	Slightly Harmful	Harmful	Extremely Harmful
Likely	Moderate Risk	High Risk	High Risk
Unlikely	Low Risk	Moderate Risk	High risk
Highly Unlikely	Low Risk	Low Risk	Moderate Risk

Using this risk assessment matrix UWTSD can then determine which risks fall into what category explained in Table 2-2 below.

Table 2-2: Descriptions of the UWTSD risk assessment matrix (UWTSD, 2024)

Description of Risk Assessment Matrix	
Likely	Will occur at some time
Unlikely	Not expected to occur
Highly Unlikely	Exceptional occurrence
Slightly Harmful	Minor injury basic first aid only required
Harmful	Significant injury adherent medical treatment required
Extremely Harmful	Significant, ongoing, progressive or irreversible injury critical medical response required

3 Engineers Role in Society

3.1 Overview

Engineers now have a duty in society to make sustainability a priority in their work. Sustainability has never been something considered as highly as it is today, looking at Formula One they are using hybrid engines and partially sustainable fuels to reduce their carbon footprint, and they aim to use 100% sustainable fuels by 2026 (Zoya Mirza, 2024). This opens the question of how engineers think when they are working on their projects in regard to sustainability.

3.2 IMechE

In the IMechE Code of Conduct for engineers it talks about how we should engage responsibly with the environment. We need to recognise the importance of socioeconomic and environmental factors in our work and comply with obligations for health and safety and environmental protection. Also take account of the needs of a diverse environment, while never knowingly or deliberately exploiting natural resources. Balance the needs of the present with the needs for future generations. (IMechE, 2024)

3.3 Aston Martin Formula One Team

Aston Martin Formula One team is a relatively new team to the grid, their sustainability and environmental policy considers more specific informative guidelines in their own code of conduct rather than the more generalised IMechE code of conduct. It talks about how Aston Martin will design for energy performance improvement and give the correct training to ensure all staff understand their responsibility to the planet. They also measure and report environmental performance on a regular basis. (Martin Whitmarsh, 2023)

3.4 Comparison

Both codes of conduct share the idea that engineers today have to keep sustainability as a top priority even if it means neglecting the full potential of their work while reporting on their contribution to keeping sustainable. Overall sustainability must be kept a top priority to ensure future generations have the same opportunities to enjoy and contribute to motorsport across the world.

4 Problem Solving

Engineers face many problems when working in industry. When it comes to developing new products and there is an issue found in development, an issue found once the product is on the market and a supplier issue in the production process engineers have a duty to find a solution.

4.1 Issues Found in Development

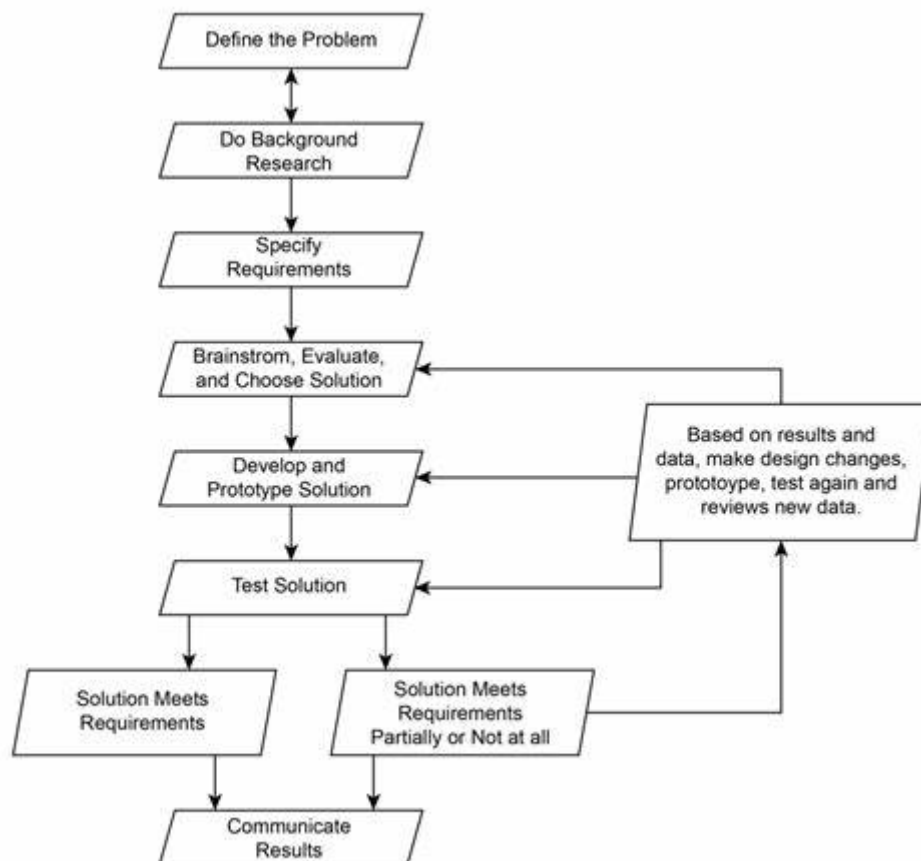


Figure 4-1: Flowchart showing an engineer's process of finding a solution (No valid author)

The design process in engineering is a very systematic process with many steps to ensure that the product is made to the highest standard. There are many steps and as shown above in Figure 4-1 the route to finding a solution in development can vary in difficulty depending on how big the issue is and how far along the development process you are. For example, you may have lots of data to be able to pinpoint the issues however, if you are earlier on in the process less data may be accessible for your product to be able to find the issue and find a solution. (SGW, 2024)

4.2 Issues Found Once On The Market

To solve an issue to a product that has been found once on the market would mean more data would be accessible to the engineer as customers would be able to assist in giving feedback in what the issues are helping speed up the process of what the issue is. Although the engineer still needs to find the cause of the problem hence leading them to go through the flow chart of Figure 4-1

4.3 Supplier Issues In Production Phase

To solve an issue with a supplier in the production phase the engineer may follow the plan in Figure 4-1 but with added steps as the engineer will have to collaborate with the supplier and find temporary fixes to ensure that they can keep up production. The supplier's performance needs to be monitored until the engineer is happy that the long term reliability of the supplier is guaranteed.

5 Team Structure - UWTSD Team MCR

5.1 Overview

Over the course of the past year, I have spent my time involved in the student motorsport team at UWTSD. I have found myself spending my time learning about what it is like being part of a racing team gaining real world experience that will benefit me for my future.



Figure 5-1: Team photo at Snetterton Circuit - Photography by Dewi Miller

5.2 Current Team Structure

The team structure is centred around three main positions: Team Lead, Car 40 Lead & Car 44 Lead. The Team Lead chooses the direction of which the team goes into for the following season, for example choosing to focus on brand new developments or working on maximizing current developments. Car 40 & 44 Leads are the race engineers to the drivers and make decisions on what work is done to the car they are in charge of. The work to be done on the car is also delegated out from these two onto the rest of the team members. There is also the 'Head of Sponsorship' and 'Head of Workshop' which is new to the leadership, but it has been welcomed in as it creates a healthier environment for new members as they can be easily guided into what they can do with someone in charge of a more specific area.

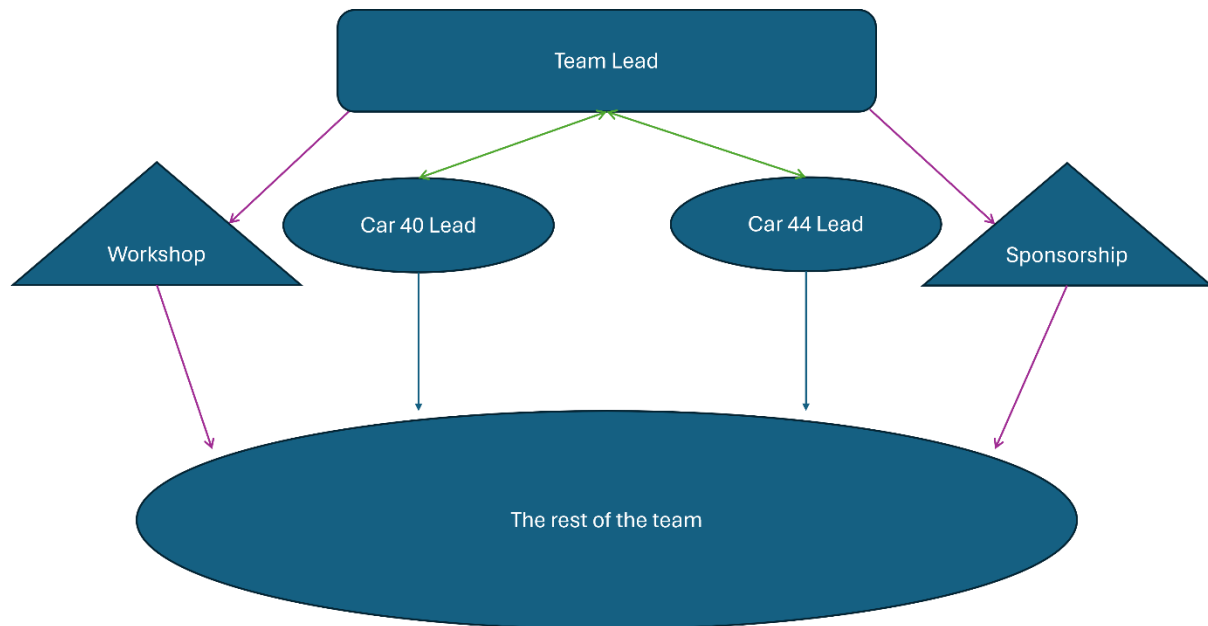


Figure 5-2: A simple diagram showing the team structure (Ethan Davies, 2024)

As much as having 5 consolidated leaders within the team is good for newer members looking for guidance, I think that it can also create a power struggle where there is no clear leader regardless of the named roles they have. Having too many leaders in the same group can cause the team to make less progress due to conflicting ideas and methods. (Art Markman, 2016).

5.3 Circular Structure

After researching into team structures and looking at how other teams and business's structure themselves I think that a 'circular structure' would fit the team better as we need fluid relationships, ease of information and streamlined communication. The circle can have multiple layers until everyone in the team has their place. (Team Asana, 2024) I think the circle should have 4 layers the inner being the team leader, then the car leads, next sponsorship & workshop and the outer layer being the rest of the team. I think this would benefit the team in all areas and would increase the efficiency of team too because the fixed structure means we have leaders around us in the structure we can go to for help that can relay with the other leaders more effectively.

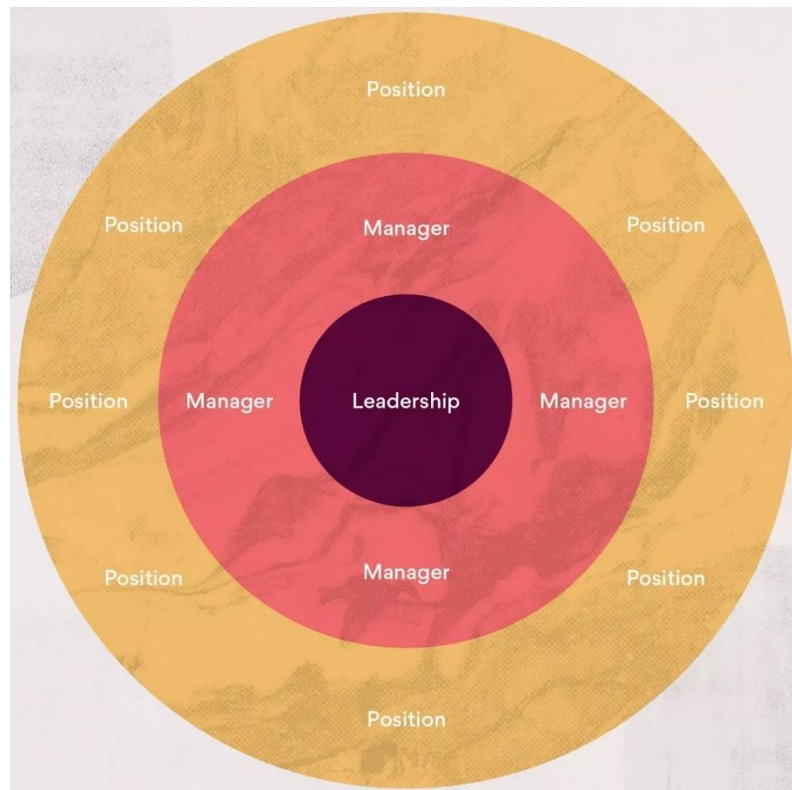


Figure 5-3: A diagram displaying an example of circular team structure (Team Asana, 2024)

5.4 Comparison

Comparing my theoretical team structure with the current structure I can see that my idea would be a concept that may seem quite alien to the team as it has always been run in a 'hierarchal structure' which when done effectively does work but it requires too much authority per person meaning that each 'leader' in the team may make a decision that the rest of the team won't be able to disagree with. However, in the circular structure all leaders (bar the team leader) will have to agree on their ideas and vision before going ahead.

6 Personal Development Plan

Name – Ethan Davies

Degree – BEng Motorsport Engineering (with foundation year)

Qualifications – 9 GCSE's , WJEC Level 1&2 Engineering, National/Foundation Welsh Baccalaureate & Skills Challenge, 2021 UWC Atlantic International Baccalaureate Diploma.

Awards & Certifications – 2021 General Dynamics Engineering Excellence Award, LIBF Level 2 Certification Financial Capability & Career Development A*, 2022 UWC Robert Bosch Sustainable Cities Summer Camp Certification.

Previous Experience – 1 year with UWTSD Motorsport & attended all championship rounds.

Short Term Goals (0-5 Years)
Obtain my bachelor's degree in Motorsport Engineering, Gain more experience with a motorsport company, Captain my football team
Long Term Goals (5+ Years)
Work for a Formula One team Become established in the Formula One Industry Become apart of management of a Formula One Team Become a teacher Move Abroad

Goal	Objective	Resources Required	Measurement	Target Date
Obtain my degree	Achieve a First	Good work ethic, dedication, positive attitude	Final grade is a given as a first class with honours	May 2027
Captain my Football team	Be able to captain my football team in a league game	Leadership, Teamwork	Captain my team and lead them to a win	Summer 2026
Gain more experience with a motorsport company	Get an internship with a racing team	High grades, unique CV,	Be apart of a team for a period of time learning essential skills	Summer 2028
Work in Formula One	Get a job as a mechanic or designer in Formula One	High level of Experience, Well developed and unique CV, First class degree	Get a job working for any of the 11 teams on the Formula One 'grid'	Winter 2030
Become established in the Formula One industry	Have worked in Formula one for a few years and worked my way up the job ladder	Good work ethic, good productivity High standard of work produced	Have a well secured job in the industry with no risk of being let go	2035
Become apart of management	Be in charge of a sector of a Formula one	The best standard of	Gain the position of 'Head of	2040

of a Formula One Team	Team e.g. Aerodynamics	work in the team.	Aerodynamics' or 'Head of Powertrains' etc	
Become a Teacher	Obtain a teaching role	Be knowledgeable in a given sector of motorsport and become proficient to be able to teach it	Be able to teach to others the knowledge I have obtained over my years in motorsport to others who aspire to do the same	2040-2050
Move and work abroad	Move to another European country or the USA	VISA, a job in the other country	Acquire a permanent VISA to be able to live in another country	Summer 2032

7 Conclusion

Overall, engineers have many different roles and responsibilities that they have to adhere to and must work to be the best of their abilities to ensure the work they produce is sufficient.

In Health & Safety engineers must ensure they are up to date with the most recent risk assessments and safety equipment to guarantee not just their safety but the safety of those around them as well

The role of engineers in society explains how important it is that sustainability is a primary concern of their work for the world as we know it is genuinely at stake

Engineers must also be proficient in problem solving as problems arise all the time at any moment and they must be ready to find a good solution in the minimal amount of time.

The team structure in a group of engineers has to be clear, apparent and straightforward to establish clear leadership for else the work produced will not be as valuable.

My personal development plan has laid out my sights for what I can work toward to keep me motivated to work hard to achieve these goals, even though they are very difficult especially from a background without motorsport.

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