University of Wales Trinity Saint David

Wales Institute of Science and Art



Engineering Technical Report

Workshop and Practice ACHA4011

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Matthew Starke

2200996

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Introduction

This report will consist around exploring several topics such as the topic of Health and Safety with risk assessments, following into the vital roles of engineers in society, through their high standards and code of conduct they are expected to follow for their organisations. I aim for the report to then go on to explore issues engineers may face in industry, and the problem-solving options they must use. Following on, team structures will be discussed along with a personal development plan and conclusion. Overall, I believe this report will give a good insight into the world of engineers through these various topics mentioned above.

Chapter 1 – Health and Safety with Risk Assessments

An activity and task that has undertaken since stating the course is a full car engine stripping and rebuild task. Although this may seem too severe from and risk and health and safety perspective initially, there are a few risks that come with this task, and certain safety precautions that must be followed. These certain precautions that are considered when carrying out a task such as this are ones such as, heavy lifting precautions when lifting and moving parts of the engine and the whole engine during the process. 'The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)' states that, 'If your business or organisation undertakes lifting operations or is involved in providing lifting equipment for others to use, you must manage and control the risks to avoid any injury or damage.' (Health and safety executive (HSE))

Where you undertake lifting operations involving lifting equipment you must:

- plan them properly.
- using people who are sufficiently competent.
- supervise them appropriately.
- to ensure that they are carried out in a safe manner.

Specific PPE was required to be worn to undertake this task, these were Steel toe cap boots and a dust/lab coat to over our normal clothes to protect us from any dirt and/or chemicals you may come across during this procedure.

Using a risk matrix is an effective way to have suitable understanding of the health and safety risks you may be faced with whilst undertaking a certain task, such as engine stripping, and outlines the severity of these risks and what the worst outcomes could be.

Below is an example of a Risk assessment Matrix aimed towards a task such as engine stripping.

Figure 1

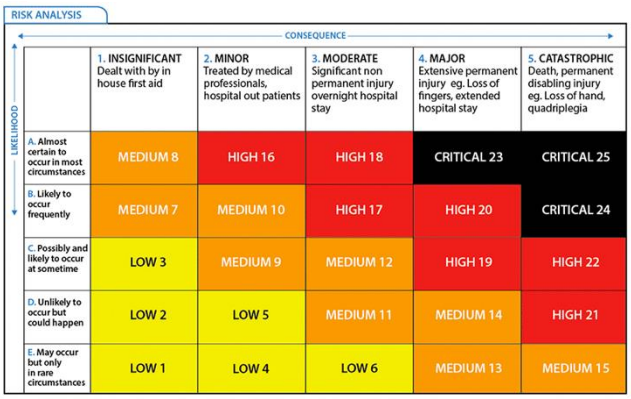


Figure 1, Risk Assessment Matrix.

This Matrix displays to the occupant undertaking the task the likelihood of health and safety risks occurring, versus the consequence that may result from these risks. For example, a risk such as, the engine falling off the rig it is bolted into and falling onto your feet could be looked at as an unlikely and very low risk to occur. Therefore the consequences of this are low to medium at its worst due to the unlikely outcome of this risk, compared to a risk such as, dropping the engine sump on the floor/feet when taken off the engine could be pretty likely to occur for certain individuals and as a result the lowest consequences is of medium level, up to a high and even critical level due to the common risk of this incident happening. This also proves the important and compulsory nature of having to wear steel toe cap safety boots when carrying out a task such as this.

Chapter 2 – Engineers Role in Society

Chartered Engineers are held to high standards in their workplace environments, through certain code of conducts they may be expected to follow to retain safety and high standard amongst their work. 'Engineering code of ethics ensures that engineers put the safety of the members of the society first when doing their work. It means that an engineer will work with standard and approved material and that they will follow the set engineering procedures during their career', (PDH-PRO.com)

Figure 2



Figure 2, engc.org.uk.

This figure displays some specific guidance for engineering professionals, from a sustainability and environmental perspective in society which is very much a hot topic at the moment for industries to work towards in the future.

The IMechE group are an Energy, environment, and sustainability group (EESG). They exist to represent and work with engineers towards the transition to a sustainable future, providing certain conducts that should be followed to achieve this goal. Including engineering changes that enable desirable technological and non-technological changes among society.

'Our Code of Conduct covers the fundamental behaviours which all members are expected to abide by. As a professional body, we promote high standards of ethical conduct among our members to:

- Protect the members of the public-
- Protect IMechE members.
- Uphold the reputation of the Institution and the wider engineering profession.'

(IMechE, code of conduct explained)

This shows the level of professionalism from this organisation towards their work, especially within the public eye. Making sure each and every one of their members always abides by the same fundamental rules. In particularly moving forward through a more sustainable future for all, through all departments but more importantly in the automotive sector which ids facing huge changes and risks to the future of the industry and engineering roles in order for them to abide by the correct and law-abiding rules coming into place over the next 10-15 years.

Chapter 3 – Problem Solving

'Engineers can face issues on a regular basis, particularly in industry'. Therefore, having a solid and well-thought-out problem-solving technique, this can allow for these problems to be solved quickly and effectively if and when they arise. A good and effective way to help solve specific problems in through the use of flow diagrams and charts, an example of one of these is below in figure 4.

Figure 3

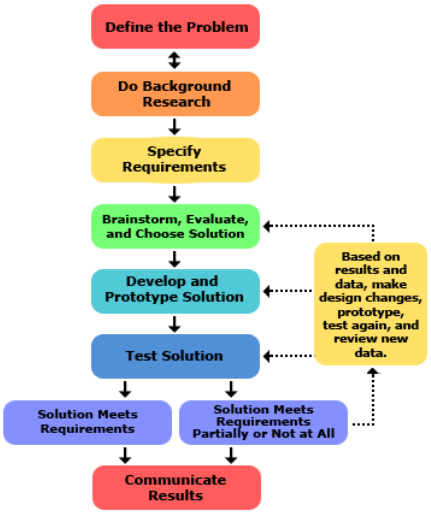


Figure 3, Flow diagram.

Figure 4 also shows a good method for one of the fundamental issues engineers may face in industry which is, 'An issue found during development of a product'. The flow diagram above gives a good structure for how to avoid this problem from occurring, and how to resolve it if this issue does unfortunately occur in production.

Chapter 4 – Team Structure

'In many engineering contexts teamwork is an essential part of productivity, facilitating high-level performance and assuring quality products and services' (Herro, D., McNeese, N., O'Hara, R., Frady, K., & Switzer, D. (2021)).

My most reason experience of working in a team was during foundation year of my university degree. We had a group project module of which we were in groups of 5/6 and had to design and create a theoretical model of a soapbox race car, to be run in the local soapbox competition. The main type of team structure we used was a more basic and simpler version of a hierarchical team structure, consisting of 1 main leader and organiser and the 4 of us others being at the same level working with each other in an overall plan set out by our team leader. (Example below in figure 2 of what our typical team hierarchical structure looked like).

Figure 4

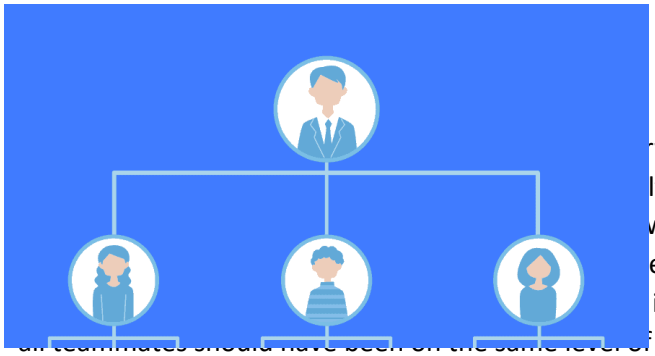


Figure 4, Hierarchical structure.

rward when starting the project. Motivating our lthough, I believe towards the end, this work for the group as deadlines were er responsibility whilst other perhaps took a in a higher workload for them when realistically leadership in the team, we just dedicated one person to be the 'Team leader' to help structure the team better, not to result in them having to pursue more work. This was probably the failed aspect of our team and team structure that most work was passed on, believing 'certain jobs' were not for their role etc.

'A body of studies suggests that hierarchy in a team tends to decrease uncertainty in interpersonal interactions by establishing order and rank differentiation…. Moreover, team hierarchy has been found to benefit intrateam coordination…. Second…., Team Structure and Team Performance when roles, tasks, task sequences, and schedules have been clearly specified by a team's structure, team members are likely to know others' tasks and plans.' ('Hao Ji, & Jin Yan. (2020))

These statements provide a benefit around the Hierarchical team structure by explaining how it can reduce uncertainty amongst the team with knowing who is required to do each role. Although, I do

not believe this approach happened within our team structure and I believe the hierarchical team structure caused more issue than good at points in the project.

A different type of team structure that could have been appropriate for our team, resulting in greater succession in then completion of the project could have been a matrix team structure. An example of a basic matrix team structure is shown below in figure 3.

Figure 5

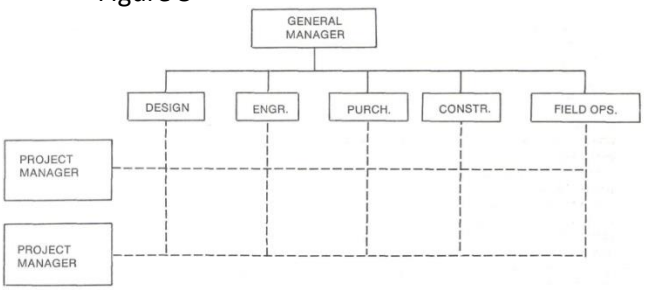


Figure 5, Matrix team structure

This structure could have worked well based of the fact it helps create a balance between leadership and ultimately, the decision-making process amongst the rest of the team members. Taking away some of the 'team leaders' full responsibility of the team, which other members of the team may take for granted when bypassing aspects of the work for others.

Chapter 5 – Personal Development Plan

Name – Matthew Starke

Degree – Automotive Engineering

Previous Qualifications – GCSE, A Levels

Previous Experience – Currently have a part time job at a Kart track helping marshal and mechanic to provide extra skills in my chosen career path alongside university.

Long Term Goals (5 to 10 years)
My long-term goals are to pursue a stable and solid career in the automotive industry, following on from my university qualification and experience gained.
Short Term Goals (0 to 5 years)
My short terms goals are to pursue my university journey, gaining experience and knowledge along the way, to help earn my qualifications and move onto to a career in industry.

Goal	**Objective**	**Resources Required**	**Measurement**	**Target Date**
Pursue Uni course.	Gain knowledge and experience to take forward into industry.	Uni resources and facilities.	Feedback from tutors and results.	End of course - 2026
Complete and pass Uni course with the correct qualification to gain access to an industry career.	Complete final year and come away with a reputable qualification that employers are looking for.	Uni resources and facilities.	Results.	End of course - 2026
Acquire a suitable and relevant job in industry.	To be offered and accept a job in the automotive industry, following my degree.	My Uni qualifications.	Industry employers.	Following university – 2026/27

Pursue a stable and solid career.	To be in a stable job in the automotive industry that I am happy with and believe it will take me far through my career.	A stable job in industry.	N/A	N/A

Conclusion

Overall to conclude on this report, I believe it has outlined many crucial aspects involved within the engineering world, such as important health and safety actions that need to be properly followed and undertaken. Along with ‘Engineers role in society’ section which displays the relevant code of conducts certain engineers in different organisations have to follow to be a respectable engineer in their department.

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