

University of Wales Trinity Saint David

Wales Institute of Science & Art



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Engineering Technical Report

Workshop and Practice (ACHA4011)

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1 Introduction

To write a report about health & safety along with risk assessments, the roles of engineers including the code of conduct and standards they follow, different types of team structures in the industry and how problems are tackled.

2 Health & Safety with Risk Assessment

The Health and Safety at Work Act, established in 1974, placed responsibilities on the employer and employee.

How and why the HASAW Act was introduced due to the hazardous working conditions during the industrial revolutions between 1760 – 1840. This Act also allows new regulations to be imposed more efficiently later (Tudor, 2024). The “Six Pack” Regulations are the significant regulations that came to effect following the European Union Regulations which include:

- Management of Health and Safety at Work Regulations
- Manual Handling Operations Regulations
- Display Screen Equipment Regulations
- Workplace (Health, Safety, and Welfare) Regulations
- Provision and Use of Work Equipment Regulations
- Personal Protective Equipment at Work Regulations (Hudgell Solicitors, 2024)

A person operating a lathe machine falls under the Provision and Use of Work Equipment and Personal Protective Equipment at Work Regulations. Under the Provision and Use of Work Equipment Regulation, the HSE states that the equipment must be inspected and maintained in a safe condition therefore it is suitable for its intended use. Ensure that safety measures such as guards and emergency stop devices are operating properly in case of emergencies and that markings and warnings are clear and visible. Furthermore, the person must have received appropriate training and be briefed on the risk assessment. [HSE, 2024]

Even with safety measures applied, some hazards may still remain. Personal Protective Equipment at Work Regulations declare that employers must provide required PPE to employees free of charge. This regulation offers protection from hazards and may reduce the risks of causing harm. The person must be provided with instructions on how to use the equipment, which should be maintained in good condition and stored properly. [HSE, 2024]

In operating a lathe machine, a person is provided with eye protection, steel-toe boots and an overall. Eye protection offers a shield against flying swarf during the operation while steel-toe boots protect the foot in case of falling heavy material or tools. Lastly, an overall keeps any loose clothing within to prevent getting caught in the lathe and protects the skin from harsh chemicals and sharp objects. Remove any pieces of jewellery that may be dropped in the lathe or tangle, and that long hair is to be tied up.

		Severity		
		Low	Medium	High
Likelihood	Probable	Medium noise level		
	Possible		Flying metal swarf	Loose clothing caught on levers
	Improbable			Failure to maintain safe guard and emergency stops

Table 1 Risk Matrix for Lathe Machine

The table above shows a risk matrix for a lathe machine. It shows the likelihood of the hazard occurring and how severe it may be. For example, a moderate noise level is unavoidable when operating the lathe machine. Ear protection can be used to minimise the noise. Flying metal swarf can occur sometimes and can damage the eyes and sometimes the skin. Safety glasses and an overall reduce the severity from medium to low. Loose clothing can catch on levers which can be fatal to the person and the machine, overall lowers the risk but it can still be severe. Lastly, the failure to maintain the safeguard and emergency stops of the lathe machine can be very fatal in emergencies. However, the likelihood of that happening is low due to the regulations requiring it to be maintained for safety.

3 Engineers' Role in Society

Professional engineers are held to a high standard and that they follow a code of conduct from their respective companies. Even if the code of conduct may differ from others, maintaining safety is important not only for the company and other members but also for the general public. It would also consider the importance of environmental factors and the sustainability of their projects. The Institution of Mechanical Engineers has four principles they follow. They maintain professional and up-to-date knowledge while disclosing limitations to undertake work and carry out services within their competence. Act with integrity avoiding unethical acts and corrupt practices. Comply with environmental protection and exercise engineering leadership respecting and supporting diversity in the industry. (IMECHE, 2021)

The Institute of Automotive Engineers Assessors have 19 rules that they abide by. Even though the code of conduct may be different, the outcome is still the same. Their members must be in an orderly manner towards clients, employers and employees. Avoid dangers to health and safety and avoid risk to the company's security whether it is physical or cyber. Shall act with compliance to the principles of sustainability and avert avoidable negative impacts on the environment and public. (IAEA, 2024)

In motorsport engineering, they recognise their role in reducing the environmental impact on global operations; notably, F1. Their goal is to have a net zero carbon footprint by 2030 with the objective of innovation, inclusivity and sustainability in the future. The F1 sustainability policy is compliant with the international standard ISO 20121. (F1, 2024)

The ISO 20121 is the event sustainability management system and applies to all type of events and sizes that promotes organisations in practising eco-friendly events and reduces environmental impact. This standard contributes to achieving climate neutrality and integrating climate action in governance and management. (ISO, 2024)

4 Problem-Solving

Engineers face issues daily. To address the problem, they can use many different methods of problem-solving.

If an issue is found during development, Brainstorm with the team to find solutions for the problem. This provides multiple perspectives from others that may view the issue in a different way which promotes ideas avoiding biases from one viewpoint. Brainstorming saves more time by generating more ideas from others. This will assist the team in increasing their chance of reaching a solution sooner compared to facing the problem alone. The essence of brainstorming is gathering ideas from others but also exploring those ideas further. It creates opportunities for others to build on that concept. (Lucidspark, 2024)

If an issue is found on the market, researching is a good option to tackle the problem. Researching the market will provide information on competitors and consumers and help the team identify their audience and the competitors they will be up against. Recognise any trends that may provide opportunities to utilise. Once they recognise the customers' needs, this will provide information on what can be altered to the product to meet the preferences. Researching the customers' feedback on competitors is information that can be considered to modify the product further. (Ambegaonkar, 2024)

If a supplier issue is found in the production process, the team can use the IDEAL method to solve the problem. Firstly, identify the problem, which is the supplier. Define the problem, is the supplier not communicating? Does the material meet the standard the team requires? Does the part they provide for the product have the wrong dimensions? Examine the choices to undergo, confront the issue with the supplier and negotiate or scout a different supplier. Act on the plan once everyone on the team has chosen the direction. Look for consequences, various suppliers may cost more and how it may affect the relationship with that supplier for future collaboration. (Wigan & Leigh College, 2024)

5 Team Structure

Our team structure consists of each member assigned to a topic to research for our soap-box team project report. The topics were:

- Design
- Dynamics & Driveability
- Organisation & Communication
- Materials
- Costing

We then read over our roles to ensure that everyone establishes what they will be doing and what to research for. My team established a fortnightly formal meeting schedule so that our research is not hindered and to update each other's progress to ensure that everyone is clear with their research. The meeting was used as support if they required additional help. A colleague created a shared Word document with the team so that we could collaborate in real-time. If a team member couldn't join our meeting, we used the comment feature in Word to keep them up to date with our progress such as changes or requirements. This helped us communicate essential information to others who require it. For example, I was assigned to the dynamics & driveability of the soapbox, I would need the final design that my colleague produced for the design research. This allows me to decide how long and wide it must be as it can affect the manoeuvrability. The research we procured and proofread is piled here in the form of a report, allowing fluidity in development especially when reaching the deadline later.

Our time management was a major concern throughout the project, so we utilised a Gantt chart to keep the time we spent on a section of the project in check. During our first meeting, we listed every task required for the project ensuring that we did not miss any information and set a rough deadline for when those tasks should be completed. As time went on, we were able to complete our project before the deadline.

When researching what type of team structure this was, the most similar would have been a flat organisation structure. This team structure bears more responsibility to each member and adopts more open communication. It encourages more involvement in my team but less supervision therefore the use of time-management tools. The downside is that it can create confusion due to no supervisor for each section hence we schedule meetings. The research for each member is more generalised than focusing on one point. For example, the design member must create 3 different designs on their own which can produce biases for the design. (Lucidchart, 2024)

One team structure that could have been used is a divisional organisation structure. All my team members assigned themselves to one section of the project instead of individually. It promotes brainstorming sessions in our meetings on what to research for that section. The responsibility is distributed to all members. After completing this section, move on to the next then so on. However, this structure is mostly used for a big team and we only had 5 in my team. This could have taken more time since only one section is progressing. (Lucidspark, 2024)

6 Personal Development Plan

Name – Jeremi Gumapos

Degree – N/A

Previous Qualifications – BTEC Level 3 Engineering and Extended Diploma (College)

Previous Experience – N/A

Long Term Goals (5 to 10 years)				
I want to be able to find a job to support my hobby and family				
Short Term Goals (0 to 5 years)				
My short-term goal is to complete my university course and graduate.				
Goal	Objective	Resources Required	Measurement	Target Date
Be a mechanic	To understand how all parts of a car work	University lectures & library Internet	Learning from lecturers Researching on the internet	07/2027
Be a motorcycle mechanic	To understand all parts of a motorcycle	Extracurricular activities Internet	Learning from extracurricular activities Research on the internet	07/2027

Table 2(Tudor, 2024)

7 Conclusion

In conclusion, an engineer plays a huge role in industries and society. They hold a high standard and follow the code of conduct to maintain safety for others and provide professional manners to other members and clients. They use team structures to ensure that projects for the company are settled before the deadline and use problem-solving methods to resolve any issues throughout their career. They follow regulations and standards to ensure safety and sustainability while also preserving innovation for the future.

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