

UWTSD

WISA



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Workshop and Practice

ACHA4011

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1 Introduction

This report consists of several key factors an engineer must face. These factors include the risks engineers must consider, how they work together as a team and how problems that are faced are solved. The combination of the factors mentioned and others are what truly makes an engineer. Other areas of this report include a personal development plan, which outlines some of the goals and aspirations that are hoped to be achieved in the future, and different types of team structures that can be used.

2 Health and Safety with Risk Assessment

An activity undertaken by engineering students at UWTSD is using a Lathe during the Machining section of the workshop module. A lathe is a machine used to cut shapes into materials such as metal or steel, the lathe does this by rotating the material whilst a sharp tool is pressed against it (*LATHE | English Meaning - Cambridge Dictionary*).



Figure 1 - An example of a lathe in the UWTSD Machine shop

Whilst students were using the lathe, there were many health and safety measures in place to make sure the activity could be done as safely as possible. For example, safety goggles and steel toe boots were mandatory. This is in place to prevent metal swarf that can come off when removing material from ending up in someone's eyes, and the steel toe caps are worn so if any heavy material is dropped a student does not end up breaking a bone in their foot. Adrian Dix, who was leading the lathe activity, made sure all the students taking part followed the correct procedures whilst using the lathe. These procedures included making sure the workpiece was secured in the teeth of the chuck, so the workpiece would not come flying out and hit somebody, and that the locks on the actual faceplate were pointed at the 4 O'clock position as this confirmed the faceplate was secured. Other safety procedures included standing at a safe distance away from the workpiece, as again not to have any debris hit the students operating the lathe.

Another important factor that is stated in the UWTSD workshop induction is that all workspaces are kept in a clean condition (*Tile: Workshop Induction 2024/2025 | WISA IQ Workshops and Labs*). Keeping the workspace around the lathe clean is vital in not causing damage to the machine itself, and it means any potential problems that could occur with the lathe could be spotted and not obstructed by metal swarf that has been cut from the workpiece.

Table 1 - Risk matrix on using a lathe

			Risk	
		Low	Medium	High
	Improbable	Slipping whilst using the lathe	Cutting tool is loose	Workpiece becomes loose
Likelihood	Possible	Selecting the wrong rotation of the chuck	Fire from friction at too high RPM	Contact with moving parts
	Probable	Loud noise created by lathe	Contact with metal swarf	Using improper techniques whilst cutting

3 Engineers Role in Society

Two organisations that publish a code of conduct for mechanical engineers are the Engineering Council and the Institution of Mechanical Engineers (IMechE). IMechE have suggested to engineers that when developing a product, its now just as important to look at the sustainability factor as well as the cost and profit that the product will make (*6 Key Messages from Sustainability in Engineering, 2023*). Another way IMechE suggest improving sustainability is to run more simulation testing as this could cut down on emissions. For example, if a company uses software such as SolidWorks they can take advantage of the computer aided manufacturing option built into the program. This means companies can do more extensive testing on their products virtually before manufacturing and testing them in real life.

Many motorcycle companies could use this approach, for example teams in MotoGP could capitalize on this approach as many emissions are created when going testing. For instance, first teams need to manufacture a part, this is then tested in the brands factory before being taken to the track. There are further emissions created travelling to and from the track and also with the running of the motorcycles. Whilst at the moment this may not be the most effective way to test parts for a topflight race team, with advances in programs such as SolidWorks and other computer design options, this may be an option in the future for motorcycle engineers to become more sustainable.

4 Problem Solving

Engineers often use systematic problem solving when it comes to solving issues. During development, if an issue is found it can be fairly simple to resolve. As the product is still most likely a CAD (Computer Aided Design) model, fixes to this are relatively simple. These can include changing dimensions of certain parts of the model, or even changing the way the assembly works such as adding limits or restricting movement of certain parts. This can then be checked if it has been resolved through CAM testing, and if the problem persists then the previous steps can be taken until the problem is solved and the product can be moved on to the next stage.

If a product has already been released onto the market, it can be a bit more difficult to resolve. Companies could potentially recall the product and listen to feedback from customers who have used the product. From there, the manufacturer can go back to CAD and develop a solution for the problem. Once this solution has been tested and proven to fix the problem, the product can then be rereleased back into the market.

If there happens to be a problem with a supplier during the production process, for example there may be a delay in receiving supplies or the supplier becomes unreliable, engineering companies may have to look elsewhere for other suppliers or even design parts in house.

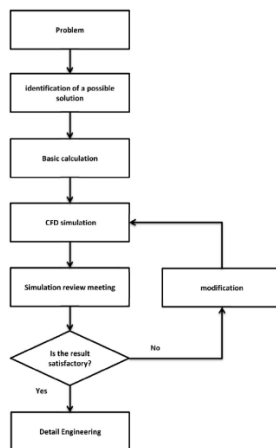


Figure 2 - An example of a flow diagram for solving an engineering problem

5 Team Structure

One team I have worked in was the UWSTD GP1 race team where we ran technical Ian Henshaw on the universities Honda NSF 250. For the Anglesey weekend, there were five members on the team. There was the rider Ian Henshaw, Brody did all the data analysis which was collected from various sensors situated on the NSF 250, Ted and I were the mechanics and Ian Phillips was overseeing operations on the mechanical side. Before each session, Ted and I would first measure the correct amount of fuel that Brody had calculated the bike needed, as to make sure the bike wasn't any heavier than it needed to be for a session. Once the bike had been fuelled, we would work through the pre-session check sheet which included torque settings for certain nuts and bolts, and making sure other operational parts of the bike function as they should, for example the brakes and clutch.

As the bike was about to leave for the circuit, first the tyre warmers would be unplugged then taken off, then the bike would be taken off the paddock stands and rolled to the rolling starter. This was the least organised part of the process as who was doing what changed several times, but it ran smoothly regardless. Whilst on track, Ted gave Henshaw a pit board with all the information that Ian would need whilst he was riding, for example what position he was in and how many laps of the session remained. When the bike returned to our pit garage, we put the bike on the paddock stands, then the warmers on and repeated the process.



Figure 3 - The UWSTD GP1 team after claiming the GP1 championship

I would describe the team structure as a mix of a hierarchical and a functional structure as Ted, Brody and I all had similar jobs and knowledge to a degree. However, the hierarchy came in when Brody analysed the data and told us what to adjust on the bike, whilst also showing us so we could gain the knowledge and understanding. For example, Brody showed me different damping settings for the front and rear suspension and different preload settings, and how all this affected the NSF 250.

Another type of team structure that could have been beneficial to the GP1 team would have been a network structure. With this, everyone would be working on the specialist areas separately and working as efficiently as possible in there specific sector. Whilst this is a key structure for the likes of teams in MotoGP and World Superbikes, with the UWTSD GP1 team being in its first full season at club level, I think the mixed structure we used was effective, as shown with a championship win. However, moving forward and thinking about next season with new members of the team, a networked structure could be more effective with more roles being added.

6 Personal Development Plan

Name – Reuben Pearson-Warder

Degree – Motorcycle Engineering

Previous Qualifications – Maths, Physics and Business A-Levels, Foundation Engineering at UWTSD

Previous Experience – UWTSD GP1 Team, Microlise Cresswell Racing at British Talent Cup

Long Term Goals (5 to 10 years)				
One of my long-term goals is to work in the MotoGP paddock, ideally in a top team and help develop bikes that will be the future of the sport. Another one of my long-term goals is to race at the Isle of Man TT or the Manx Grand Prix. This is a childhood dream of mine that I would love to be able to achieve.				
Short Term Goals (0 to 5 years)				
One of my short-term goals is to graduate UWTSD with a degree in Motorcycle engineering. From there, I would like to get a solid graduate job that can help support my personal life and help me achieve the skills needed to progress in the motorcycle engineering world.				
Goal	Objective	Resources Required	Measurement	Target Date
Graduate with a degree in Motorcycle Engineering	Do my best whilst studying at UWTSD	IQ building	Bachelors in Motorcycle Engineering	2027
Work in the MotoGP paddock	Work for a top team in the paddock	Motorcycle engineering degree, a good work ethic	Having worked in the MotoGP paddock	2030
Race at the Manx GP	Be able to qualify for a Manx GP race	ACU National licence, a solid amount of funding	A finishers trophy from the Manx GP	2030-2035
Gain my ACU licence	Complete the ACU BRA/CTC course	A race bike	Holding an ACU novice licence	July 2025

Purchase a house	Become a homeowner	Having enough money to apply for a mortgage	Owning a home	2034

7 Conclusion

In conclusion, this report has covered many different areas of what it takes to be a successful engineer. With all these factors added together, it shows the will and determination an engineer needs to thrive in what is an intense environment. It underlines that engineers are always looking at ways of improving every detail of a product or system, and what lies in the future as to what problems engineers need to face and consider.

Reference list

6 key messages from Sustainability in Engineering 2023. (n.d.). Retrieved November 26, 2024, from <https://www.imeche.org/news/news-article/6-key-messages-from-sustainability-in-engineering-2023>

LATHE | English meaning - Cambridge Dictionary. (n.d.). Retrieved November 26, 2024, from <https://dictionary.cambridge.org/dictionary/english/lathe>

Tile: Workshop Induction 2024/2025 | WISA IQ Workshops and Labs | Home. (n.d.). Retrieved November 26, 2024, from <https://moodle.uwtsd.ac.uk/course/view.php?id=7024§ion=1>