VRC HIGH SCHOOL
CAREER READINESS

BOEING

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INTRODUCTION

We selected the field of aerospace engineering and the company Boeing as our focus for this study, researching how professionals at Boeing use the engineering design process through articles and videos on the company's website and interviews with current employees.

Boeing is an interesting company to analyse because it is one of the largest and most well-known aerospace and defence companies in the world. The company designs, manufactures, and sells commercial and military aircraft, as well as provides related services. Its products and services play a significant role in global transportation and have a major impact on the economy. As well as this the company's reputation and brand were negatively affected by the two crashes of the 737 MAX, and the subsequent issues, making it an interesting subject to analyse especially since many of the problems could have never occurred if the design process were followed rigorously.

ISSUES WITH BOEINGS DESIGN PROCESS

The crashes of the Boeing 737 MAX aircraft have been linked to issues with the design process used by the company. In particular, there have been concerns about the involvement of the relevant stakeholders such as the Federal Aviation Administration (FAA) in the certification process for the aircraft. The FAA delegated some of the safety certification work for the 737 MAX to Boeing, which has been criticized for creating conflicts of interest and a lack of oversight.

Additionally, the design of the 737 MAX's flight control system, called MCAS, which was responsible for the crashes, was not adequately disclosed to pilots or fully evaluated during the certification process which is clearly incorrect in terms of the design process since a key point is to test, analyse and get feedback on your product and then re-iterate until you get it right. This lack of transparency and oversight in the design process has been identified as a significant contributing factor to the crashes.

Tragedy can be avoided by following the design process rigorously

DESIGN PROCESS

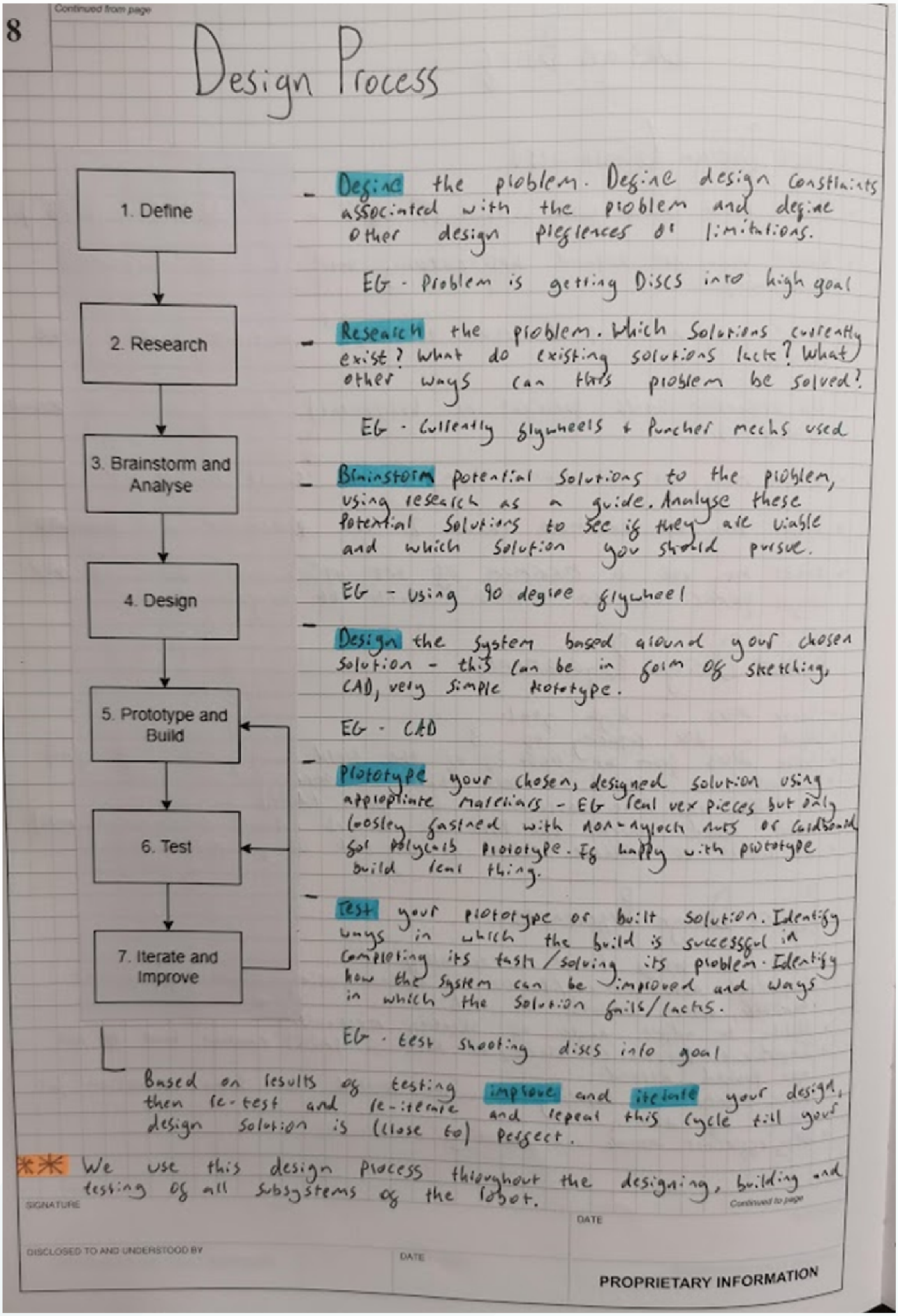
Professionals at Boeing typically follow traditional steps of the engineering design process, including:

- Defining the problem
- Researching and brainstorming initial solution
- Creating and iteratively testing prototypes
- Finally implementing the final design as a cumulation of the entire iterative process

The design process is a critical aspect of many professions, including aerospace industries. It provides a structured approach to problem-solving, allowing professionals to systematically identify, research, and test solutions. This process ensures that all potential solutions are considered and evaluated, reducing the risk of overlooking important factors or making uninformed decisions. Additionally, the design process encourages collaboration and teamwork, as multiple perspectives are needed to effectively research and test solutions. Furthermore, it helps to mitigate any errors or issues that may arise during the design process, as it allows for continuous improvement, testing and validation.

The professional approach to engineering design used in industries such as aerospace may match or differ from the approach used in robotics competitions, such as VEX Robotics, in several ways.

OUR DESIGN PROCCESS



APPROACH COMPARISON

At VEX Robotics we approach our engineering in a similar manner to the traditional process. Yet evidently, this approach at Boeing is exponentially more rigorous and systematic with every small component being tested at every stage of development due to the high stakes in the aerospace industry. This means that professionals are required to follow strict guidelines and regulations, ultimately minimising the risk of accidents or malfunctions. Comparatively, due to our defined problem set, we replicate these steps on a smaller scale but with slightly less emphasis on safety. Robotics competitions no doubt have less emphasis on social safety and regulations, thus, the teams may have more freedom to experiment and take risks with their designs.

Additionally, the time frame for professional design process is usually longer and more comprehensive than the time frame of robotics competitions. The design process for an aerospace project can take several years before the final product is ready for commercial use to allow comprehensive testing to occur. Alternatively, robotics competitions such as VEX may only take a few months of iterative development, providing a competitive edge on teams who invest more time into their robot due to the freedom of experimentation allowed.

CONCLUSION

In summary, while both professional and competition approach to engineering design process may have similarities, professional approach is more methodical, systematic and comprehensive with more emphasis on safety and regulations. Whereas, competition approach gives more freedom to experiment and take risks with the design.

Intuitively participation in VEX Robotics has prepared us for future careers, allowing us to appreciate the applications of STEM. Most notably, this has been from highlighting the cruciality of the engineering design process through hands on experience in problem solving and teamwork. The rewards are evident, as our interest in engineering and industry has flourished through almost 4 years of VEX.