

University of Wales Trinity Saint David
School Of Engineering

Dissertation (Proposal)

How a New Design Handover Impacts
Production Processes in an industrial
Environment

Independent Project ACMA 6013

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Introduction

This dissertation researches and explores why newly designed products, created in engineering departments projects, have high failure rates when released into production lines. This problem was flagged by members of a production team, located in a small engineering company, and occurred when first attempting to build the new project.

This problem could focus on researching previous design projects and explores what went wrong during that process. Furthermore, it examines what impact it has on the company and how can the cause be found and prevented to enable company growth and development.

The objective of the study will be to research and explore past projects of manufacturing and the components involved and assess what is good and bad practice.

Reasons of study

With customers requesting Caerbont Automotives to manufacture new bespoke instrumentation for their vehicles, it would benefit the company and increase its first-time success rate, if this problem were to be solved.

Study the techniques involved in those processes and use these to evaluate the methods to aid the development of a new project that can be transitioned into production with limited errors.

Furthermore, issue recommendations based on research methods studied externally by larger industrial manufacturing companies.

Aims

The aim is to look at why the introduction of new projects has had a negative effect on first time success in the company of interest.

To further examine how severe this problem is to the company's targets, explore any cause and focus on an improvement.

Literature Review

To enable a solution, researched areas of interest can prove why this problem is a good opportunity to justify there is enough research available to complete the dissertation. It could also influence the direction the project needs go to succeed, otherwise it has no value, as Thomas (2022) states.

One fact discussed in Design of manufacturing by Anderson (2014) was that the most important measure of 'time -to -market' is the time to stable, trouble free production which depends on getting the design right the first time and this could be relevant to what is happening at the current workplace of interest. This helps justify the topic's importance. Anderson (2014) further mentions that Toyotas philosophy confirms this by stating, 'The cost of a product is largely determined at the planning and testing stage. Not much can be done in improvements when production begins.'

The failure to get the design right first time in the production stage of the project is discussed also in the mechanical design process by Ullman (2017). He mentions that its much less expensive and far more effective to design quality into the product and demonstrates his ideas in this example. Two automotive companies, one who makes their design changes early, named Company A Toyota, and another called Company B, an American automotive company who are still refining the product after released to production. The second company relates closely what Caerbont Automotives processes are doing which may result in a low-quality product shown in Figure 1. The goal, he stated, is not to eliminate changes but to manage the evolution of the design which must change through interventions early in development'.

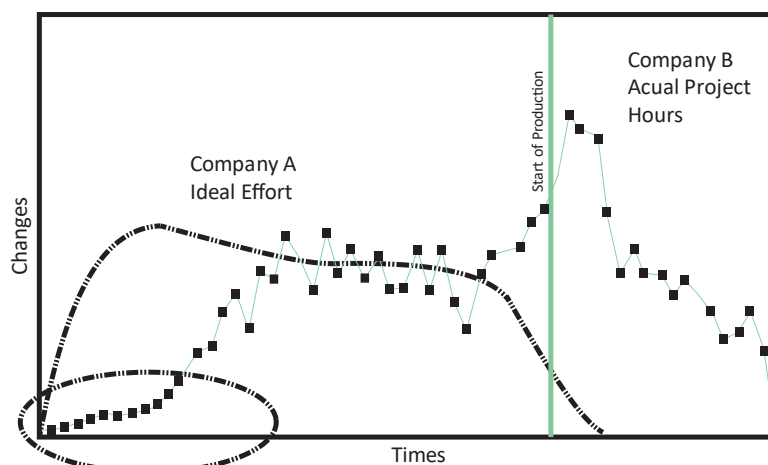


Figure 1 Ullman (20017) Comparison in Company Changes to Design

Further relevant research explores the idea of controlling the design process, specifically the control of engineering documentation. This is discussed in depth within the engineering documentation handbook by Watts (2008) who examines configuration management- the communication bridge between design engineering and the rest of the company. He then mentions the term ‘throw it over the wall’ syndrome which means not having the correct communication with key member of the workplace when releasing new products. The configuration management method, which could be further examined in the full report, ensures to whatever crosses the bridge is correctly documented, finally controlled, available when needed and gives feedback.



Figure 2 Bridge Analogy explained by Watts (2013)

Timescales

Days in the Project	Months								
	October	November	December	January	February	March	April	May	June
Research into topic area									
Study literature around topic									
Evaluate the Ethics at work									
Research on Method									
Write on solution method									
Fieldwork									
Analysis of results									
Conclusion									
Present results									

Table 1 Timescales based on Thomas (2019) How to Do You Research Project

Likely Method of Research

Initially the project could be involving research into the company's current processes through process mapping to understand the areas that are involved with the company procedures. This is suggested by the Council of six sigma certification (2018) as good way of understanding the process and give a visual depiction.

Further analysis will then identify staffs' opinions on the transition between engineering and manufacturing regarding past difficulties and previous experiences with projects via team meetings. Simply charting what the company does well when it comes to new projects and what they do poorly could give target areas to focus on.

Research could involve looking at customer data into previous customers satisfaction levels. This could be through certain tools like a customer satisfaction chart or surveys as suggest by George (2005) Ratings would be given for specific questions.

Investigation into the project's customer needs would be explored using tools such as a customer journey map or house of quality, explained by Hauser (1988), to understand better the customers' requirements before proceeding to the development of a product.

To further understand what the implementation of changes are when introducing a new product, Lewin's change model could be used as suggested by Mullins (2005), where we can anticipate resistive effects and attempt to minimize them in the future. Furthermore, implement the force field analysis to establish the need to reduce the opposing force and increase the driving forces and help understand why there are so many opposing forces by members of staff during previous projects.

Anticipated Facilities Required

Software: SolidWorks, Design Studio, SBOM Software, Ansys Granta Selector, Minitab

Laboratory Machining: 3D printer, CNC Miller or Turner

Industrial Partners

Caerbont Automotive Instrumental, who specializes in the engineering and manufacturing of car and motorcycle instrumentation. They deal with lower volume production but with higher variation in products which can range from Porsche classic to Austin Martin Dashboard Instruments. My role within the company is mechanical design engineer involved in the development of the complete design of instruments, including the assembly stack up, technical drawing, and bill of materials.

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