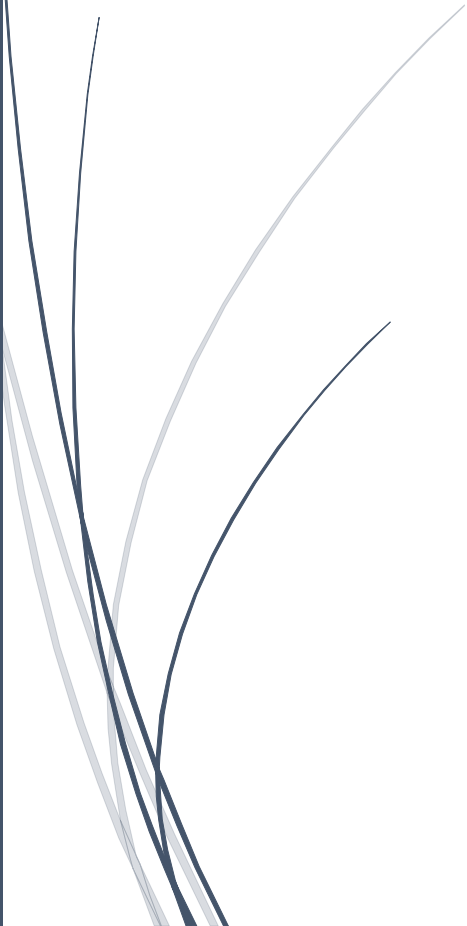


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9/22/2023

BEng Independent Project Proposal

ATOM Lights Out Running

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Table of Contents

Introduction	2
Proposed Project Outline	3
Research	3
Project Management	3
Financial Considerations	3
Specification of Parts and Components	3
Technical Aspects	3
Testing and Validation	3
Compliance	3
Review Process.....	3
Technical Information.....	4
Conclusion.....	4

Introduction

The ATOM encoder is one of Renishaw's leading metrology products. A result of this is large manufacturing volumes which requires an assembly process that can meet these demands. Currently only a proportion of the assembly process is carried out via automation processes. To keep up with increasing customer demand automating other areas of the process is critical. Therefore, the design of implementation of 'Lights out running'. The purpose of this project is to allow for the manufacturing process to be able to run with little operator intervention which will increase production output and reduce the cost of building the product.

One of the assembly areas that currently utilises a high level of automation is the 'coring' processes of the encoder. During this process the encoder body is fitted with the fundamental parts before it then goes onto the 'customisation' phase in which the assembly is then tailored to the customers requirements. It is believed that introducing light out running on this phase of the assembly process will create the highest level of benefits. The current process requires operator intervention to load and unload parts which means an operator is required to always monitor the equipment. This means when customer demand increases operators are required to work multiple shifts to keep up with demand.

There is currently a focus within the business to increase automation processes throughout the assembly of Renishaw products. This project will help to fulfil these targets while increasing production productivity. The following sections of this document detail the proposed activities that this project will entail. Also, a top-level overview of the technical knowledge that will need to be demonstrated throughout this project.

Proposed Project Outline

This section of the document will breakdown the different areas of the proposed project to help understand the key areas that will be focused on.

Research

Initially the focus will be on researching and developing the idea of lights out running. This will involve analysing current production metrics and looking at solutions currently used within industry for this sort of problem. One of the aspects that will be analysed in depth is process capability and how this can be improved. On completion of the stage of the project, a proposed solution will be put forward.

Project Management

Project management will be another key focus throughout the duration of this project. Renishaw specific techniques will be implemented and discussed to ensure that the project is delivered within the allocated timeframe.

Financial Considerations

This aspect of the project will consider the capital expenditure budget that will need to be laid out at the start of the project and monitored throughout.

Specification of Parts and Components

Upon selection of a solution parts and components will require specifying to achieve the intended outcome. Various forms of calculations will need to be undertaken to ensure the parts and components selected are rated appropriately.

Technical Aspects

The project will involve a variety of technical machinery building skills. This will include aspects such as PLC programming, electrical & mechanical design and multiple other points that will become clear as the project progresses.

Testing and Validation

Once a solution has been implemented test and validation will need to be carried out to ensure that the system is fit for purpose. Reports will then be generated as evidence that the necessary actions have been carried out.

Compliance

The final solution will need to be compliant to various standards. Compliance documentation will need to be thorough to demonstrate due diligence has been carried out. Ensuring that the Machinery Directive and all relevant standards have been complied with is a necessity of this project.

Review Process

On successful completion of the project a review will take place to identify the 'lessons learnt' which can then be utilised in future projects of this nature.

Technical Information

As mentioned in the previous section, a variety of technical knowledge will need to be implemented to deliver the final solution. Listed below are some of the technical areas already identified as requirements for the proposed project:

- Six Sigma Tools for Process Capability and Analysis
- Data Collection (SQL)
- Project Management Tools
- Machinery Design in relation to the Machinery Directive (CE Marking)
- Electrical Design in relation to BS: EN60204
- Mechanical Design (CAD)
- Pneumatic Design
- Assembly Build
- PLC Programming (Mitsubishi)
- Robotics Programming (Mitsubishi)
- Pilz Safety Systems and Software

It is highly likely that there are also other engineering tools that will need to be implemented during this project that have not yet been accounted for. Based on the above list of skills a detailed report could be produced because of the multiple areas of technicality.

Conclusion

To conclude, the proposed project incorporates a variety of aspects from Six Sigma to Engineering Design. It also includes regulatory compliance aspects to ensure the system designed will be compliant with the machinery directive. It is likely that the final solution will be responsible for loading and unloading the raw materials into the assembly robotic cell. Due to this there will be multiple considerations throughout the duration of this project which will assist with creating an in-depth report.

Based on the work that has already been completed in relation to this project the solution will have a significant impact on improving productivity and increasing capacity of the assembly process. The automation aspect of the project also presents the opportunity to expand on knowledge and understanding in this area. Currently the projected timeline of the project will ensure that it is completed in early 2024. The exact timeline will become clearer as the project progresses through the initial stages.