THE ROYAL MINT®

THE ORIGINAL MAKER

[1]

Module Code – ACDA5012

Research Methods – Research proposal

Coin Press Safety Upgrade

1982 Grabener MPU200

Developmental Research Proposal

Leon Scammell 2017986

Figure 1 – 1982 Grabener MPU 200

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1. Introduction

This development project is based in The Royal Mint, which is a coining and bullion mint located in Llantrisant, South Wales. The most profitable department within the mint is Bullion, which involves mass producing silver bullion coin to be packaged in boxes to be sent to the customer in bulk, as shown in figure 2. The Royal Mint is recently finding this line of products to be the most lucrative part of the business, so much so that there is not sufficient production capability to meet the demand. To improve the bullion coin production capability, an additional press is required in the shop floor. The aim of this project is to provide an additional press which meets all current safety standards and regulations, as well as meeting the mass production performance requirements of The Royal Mint.

Silver Bullion Coin Boxed Ready For Sale

Figure 2 – Silver Bullion Coin Packaged

After carrying out comparisons between presses available on-site, second hand presses available in the UK, and new presses which can be sourced from Grabener in Germany, a second hand press was chosen to be most suitable. This comparison will be explained in this proposal. Purchasing second hand presses allows substantial cost savings, while also matching the performance of modern presses. The main issue with buying old presses, is that they do not meet modern safety standards and regulations.

The research will involve identifying what British or European regulations and standards the project will need to adhere to, to ensure everything is up to standard. These will include standards such as BS EN 13849 (Safety of Machinery), BS ISO 16092-2 (Machine Tools Safety – Presses), PUWER regs, and many others. The sources of these standards are International Organization for Standardization [2] who develops and publishes many standards, and legislation.gov.uk [3], which are the most up to date and reliable sources of safety standards available online.

2. Background to the Proposed Research

The Royal Mint is a coining mint, which means it's primary purpose is to produce circulation coins for countries around the world. However it has also spread its capabilities to produce gold and silver bullion to produce greater profits. This involves the production of silver and gold coins, as well as bars to sell to the public either as collectable and investment items. This section of the mint is still growing rapidly as the company can sell as much bullion as they can produce, being very high in demand by customers.

The royal mint produces bullion with the use of a coining press, which automatically feeds coin blanks into a press and are then struck. This produces around 200 coins per minute when double striking, specifically for production of 1oz silver bullion coin (999 fine silver), shown in figure 3.

Silver Bullion Coin

[8] Figure 3 – 1oz Britannia 2022 Silver Bullion Coin

The Aim

The purpose of this developmental project is to implement an additional bullion coin press into the production area, study what standards and regulations must be adhered to, study what modification work is required to meet these standards, and then make the changes. Currently there is only one press in the plant that can mass produce bullion, at a rate of 200 coins per minute being double struck (meaning struck twice before being ejected from the machine). This press breaks down very frequently due to mechanical and electrical parts failures, and this completely halts all production of bullion. This is unacceptable for the business as bullion is the most profitable part of the business, so it is imperative that this process is improved by reducing the risk of production halting as a result of the only press failing. Table 1 below shows how the single press cannot keep up with current forecasts for demand. A second press will allow the mint to meet this demand.

Bullion Press Run Hours vs Forecasted Demand

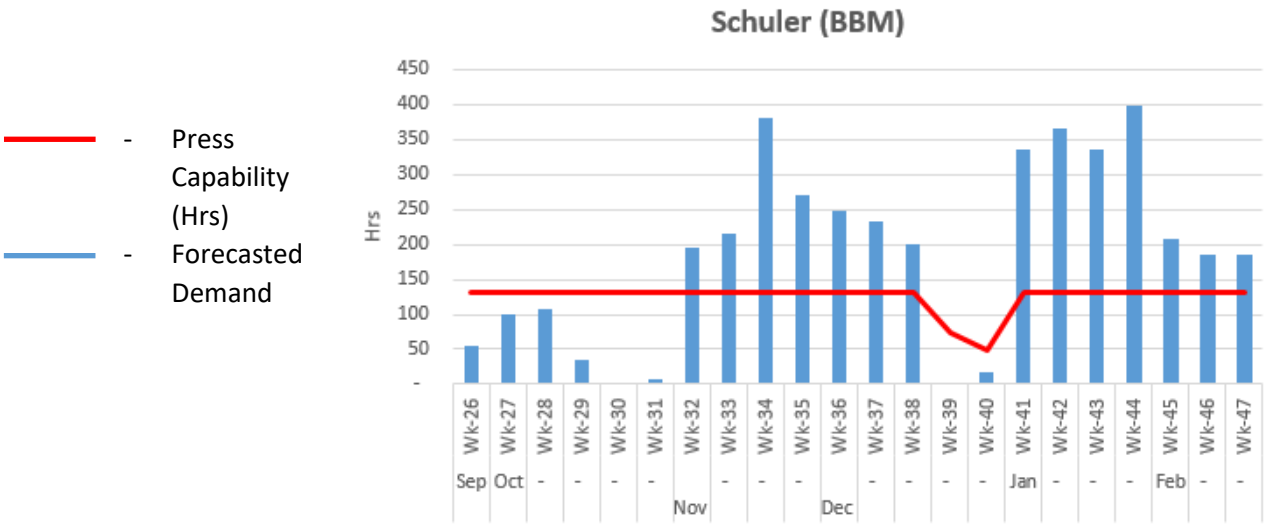


Table 1 - Bullion Press Run Hours vs Forecasted Demand

It has already been decided that a second hand press will be bought from another UK based mint called Pobjoy Mint. The press has not been used in production for around 20 years so it is known that the press will not meet modern safety standards for it to be used on the shop floor. The new press must be capable of producing 200 double struck coins per minute, capable of striking coins up to 42mm diameter and 4mm thick, and producing 200 tonnes of pressing force.

[9] Figure 4 - British Pobjoy Mint – Seller of the Press

As a second hand press is being used which was built in 1982, there is a requirement for extensive evaluation and development of its safety systems. The costs of this must also be determined so that the costs of upgrading the older machine can be compared with buying a new one direct from the German press supplier, Grabener. It is expected that the required changes will not be too difficult to implement and the project will result in far less expenditure than if the company bought a new press, while matching its performance in production.

3. Aims & Objectives

The aim of this project is to reduce the risk of bullion production being halted as a result of the single press being down due to breakdown. Having this additional press will allow production to continue if a breakdown occurs, whilst also allowing double the bullion to be produced when both presses are operational.

The seller has explained what they understand about the electrical safety system currently in place, and it is known that the system is not fail-safe, which will need to be overhauled. Even though the current interlock circuit is dual channel, the componentry is very outdated and must be fully overhauled with modern and fail-safe equipment. Fail-safe meaning that if there is a fault such as a cable breakage or interlock failure, the machine could operate without guarding being in place, resulting in operators being able to access moving parts or exposed electrical conductors. This is unacceptable for the equipment to meet modern safety standards.

Original Electrical Control Panel

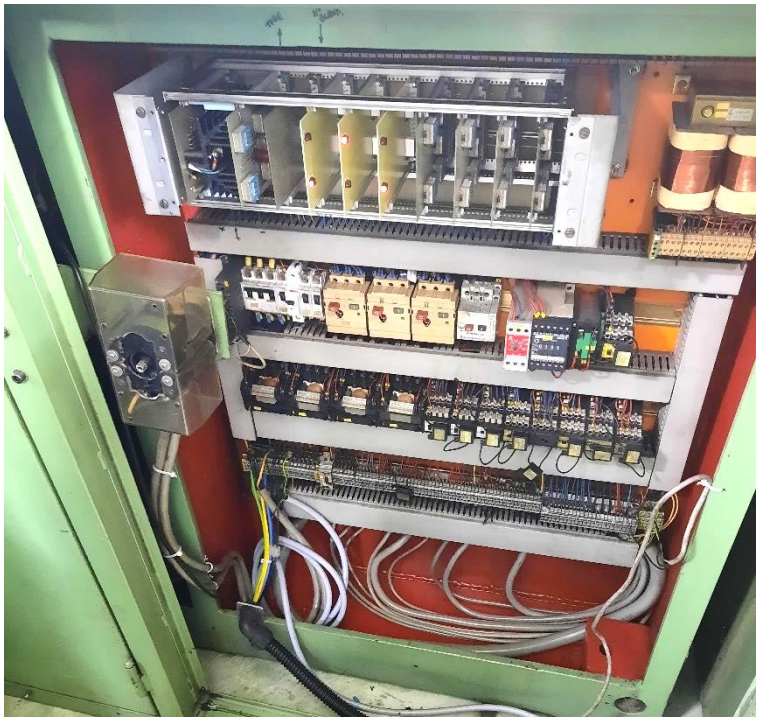


Figure 5 – Original Electrical Control Panel

Around the press there is a sound deadening enclosure, and doors around the press itself which cover the electrical control panels as well as the motor and flywheel. The front and rear doors have an outdated interlocking system which is not fail-safe, and does not use safety componentry with monitored contacts to ensure the system operates as required. Most of the doors around the machine do not have interlocks which is completely unacceptable for this machine to be used on the shop floor. If the front and rear door interlocks fail and the doors are not closed due to operator error, the machine could run with moving parts being exposed. The panel must be rated to at least IP2X, meaning people cannot touch exposed conductors. [4] People could come into contact with moving parts and exposed electrical parts.

Moving Parts in Right Side Door

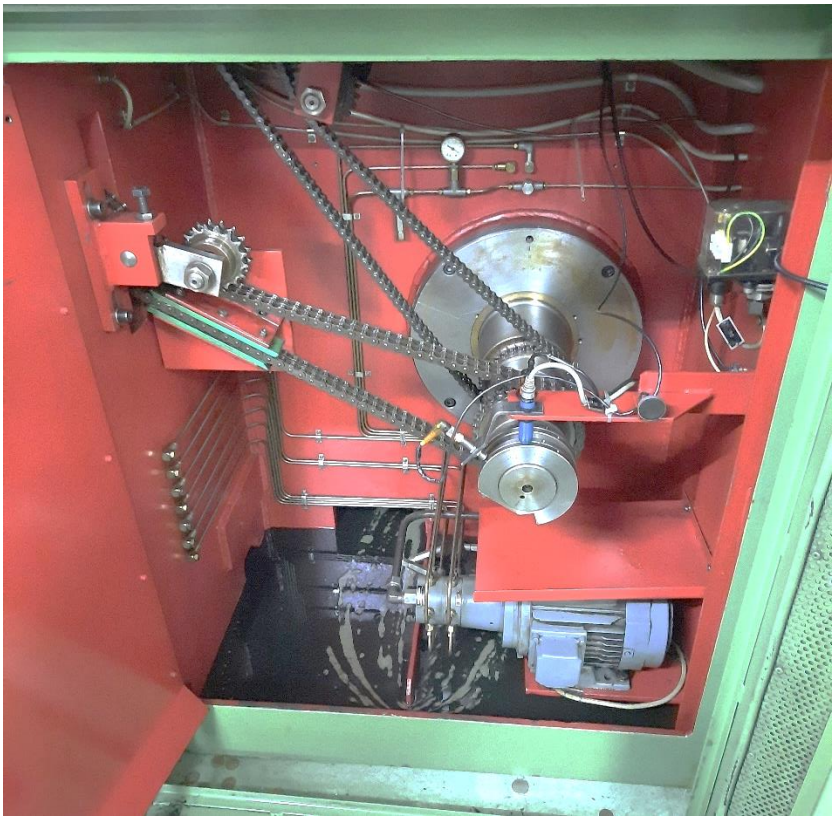


Figure 6 - Moving parts in right side door

Moving Parts in Rear Door

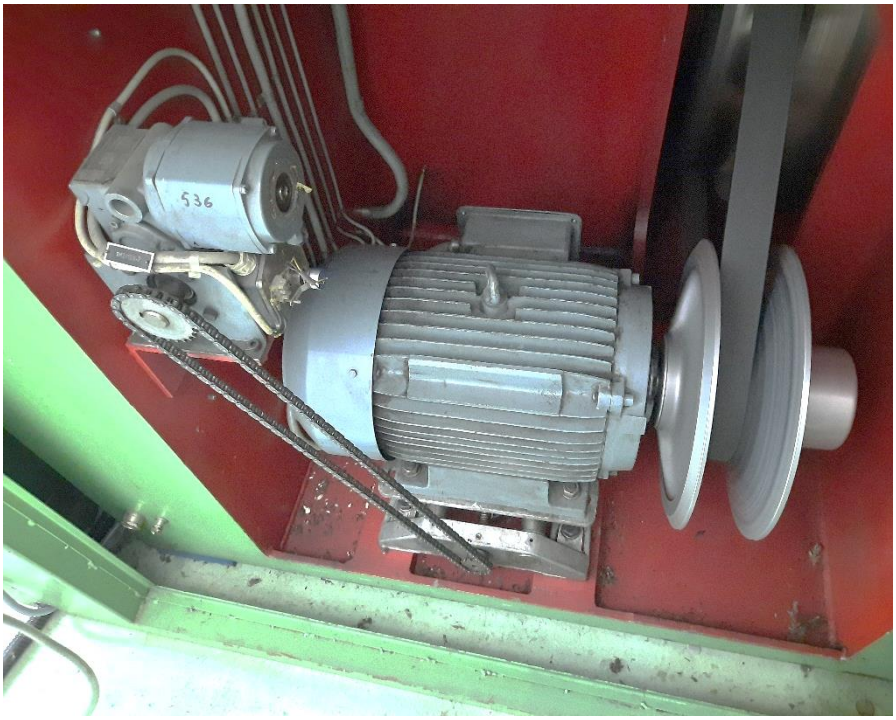


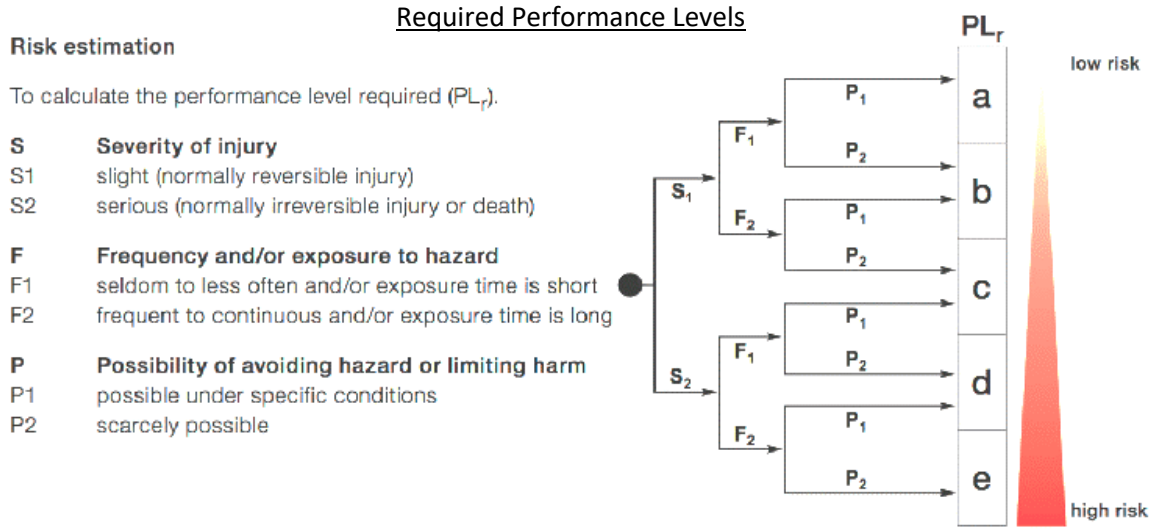
Figure 7 - Moving parts inside rear door

Extensive research will need to be carried out on what standards and regulations must be adhered to for this machine to be considered safe to use for production. These must then be complied with by installing modern safety equipment to the control system, which will drastically improve the safety of the machine.

The key safety circuit/interlock functions that have been identified for improvement include:

I. Emergency stop circuit
II. Guard interlocks (high integrity)
III. Guard interlocks (low integrity)
IV. Operator feedback via HMI

These must be improved by designing a new safety control circuit according to BS ISO 16092-2 (Machine Tools Safety – Presses) and should achieve a minimum performance level target of PLr c, so could be PLr d or PLr c, depending on ease of implementation. This performance level is a requirement for the machine's risk assessment according to EN ISO 13849-1:2015 [4].



[5] Figure 8 - Required Performance Level for a Safety Function according to ISO 13849-1:2015

To conclude, the main objectives include the following:

- **Prevent production stoppages**

  Availability of additional press will prevent this.

- **Reduce Expenditure**

  Sourcing and upgrading an older press will cost far less than buying new. Costs must be reduced as much as is reasonably practicable.

- **Learn what standards and regulations must be complied with**

  This study will provide an understanding of the required standards that a machine's safety system must adhere to.

- **Design and develop an effective electrical safety circuit**

  Research must be conducted into what standards must be complied with when designing an electrical safety control circuit. The circuit must then be designed to comply with this.

4. Development Methodology

4.1 Outline of Developmental Method

A parts list will need to be produced and costed before beginning the project so that the cost of the whole press renovation can be compared with the cost of a new press with modern systems already in place. These costs must be shown to management so that funding can be authorised.

The costs of delivering and positioning the press will need to be established, then a date for delivery organised.

The machine must be delivered into the plant with the help of an external heavy machinery moving company (Beck-Pollitzer).

Every door and guard must have an interlock switch installed. There must be e-stops at every access point to ensure they can be quickly accessed to comply with The Supply of Machinery (Safety) Regulations 2008 [6] . There is currently only an e-stop at the front which is not sufficient. More will need to be installed on the machine. All of the required equipment and tools will need to be sourced before starting the project.

The system will then require research on the best suited components to use, and be designed purely in-house.

The equipment must then be installed with effective planning of the installation activities. The gantt chart will be used to keep track of this.

4.2 Data Collection

The newly installed safety circuit will need to be tested and inspected after installation to ensure it operates as required. The tester will run the machine and simulate various faults such as leaving doors open and attempting to run the machine, to which it should operate and prevent the machine running. All potential states must be simulated and results made note of. The production speed of the machine must also be tested to ensure it meets the performance requirements of the mint, being 200 coins per minute. The PLC can be connected to a programming laptop while live so that the various states can be monitored while the various components are tested on the machine.

The new equipment must be inspected and tested after completion to ensure it is up to standard and complies with all relevant equipment regulations and standards. All of the guards, displays, contactors, and PLCs will be tested by operating them in all potential fault states, following the Royal Mint's standard operating procedure for testing of safety circuits. The following performance metrics of the safety system will be tested:

- Must isolate all forms of energy from the machine once an E-stop has been operated (air must isolate, clutch must disengage the flywheel, electrical supply to exposed areas must isolate.
- Must stop the machine immediately.
- The supply to the machine and machine itself must be visually inspected and tested accordingly to BS7671 18th Edition [7]
- HMI must display the current fault.
- PLC ladder logic and circuit drawings must be simple and understandable for other electricians.

Regular planned maintenance and inspection must finally be organised to ensure the equipment remains in safe and effective condition.

4.3 Data Evaluation

Once all of the equipment has been tested, the test and inspection paperwork must be evaluated to ensure the machine meets all electrical safety standards to ensure the safety of the operator.

Generic Schedule of Test Results BS7671:2018

GENERIC SCHEDULE OF TEST RESULTS

DB reference no ____
Location ____
Z_s at DB (Ω) ____
I_{pf} at DB (kA) ____
Correct supply polarity confirmed ☐
Phase sequence confirmed (where appropriate) ☐

Details of circuits and/or installed equipment vulnerable to damage when testing ____

Details of test instruments used (state serial and/or asset numbers)
Continuity ____
Insulation resistance ____
Earth fault loop impedance ____
RCD ____
Earth electrode resistance ____

Tested by:
Name (Capitals) ____
Signature ____ Date ____

Circuit details											Test results													
		Protective device						Conductor details			Ring final circuit continuity (Ω)			Continuity (Ω) ($R_1 + R_2$) or R_2		Insulation Resistance Test Voltage	Insulation Resistance (MΩ)		Polarity	Z_s (Ω)	RCD		AFDD	Remarks (continue on a separate sheet if necessary)
Circuit number 1	Circuit Description 2	BS (EN) 3	type 4	rating (A) 5	breaking capacity (kA) 6	RCD $I_{\Delta n}$ (mA) 7	Maximum permitted Z_s (Ω)* 8	Reference Method 9	Live (mm²) 10	cpc (mm²) 11	r_1 (line) 12	r_n (neutral) 13	r_2 (cpc) 14	($R_1 + R_2$) 15	R_2 16	V 17	Live - Live 18	Live - Earth 19	20	Maximum measured 21	Disconnection time (ms) 22	RCD test button operation 23	Manual AFDD test button operation 24	25

* Where the maximum permitted earth fault loop impedance value stated in column 8 is taken from a source other than the tabulated values given in Chapter 41 of this Standard, state the source of the data in the appropriate cell for the circuit in the 'Remarks' column (column 25) of the schedule

[10] Figure 9 - Generic Schedule of Test Results BS7671:2018

4.4 Risks & Limitations

A large risk is that the project may not be completed by the deadline, which is at the end of December 2022. This will result in the costs climbing excessively, with a goal of the project being keeping costs to a minimum whilst complying with all of the appropriate standards.

4.5 Ethical Issues

All of the data that will be used in the project for things such as gantt charts, emails between project stakeholders, photographs, costings etc, will be stored on work computers. This means there will be issues relating to data storage and protection. All data will be stored on the company cloud, which is password protected. Any memory devices will be kept in a locked drawer in a locked office.

6. Resources & Planning

6.1 Resources Required

The safety control circuit will require all parts to be planned out and ordered via the Royal Mint's parts supplier Brammer. The contactors and PLC will be Allen Bradley as the Mint uses this brand very often so there is already a good understanding of how to install and program these components.

6.1.1 Physical Resources

Before starting the project, the required tools and equipment must be checked to be present. If anything else is required it must be included in the costs of the project. All of the new electrical equipment must be bought in such as a new electrical enclosure, wiring, PLC, e-stops, interlocks, trunking, HMI, and potentially new PLC software.

6.1.2 Human Resources

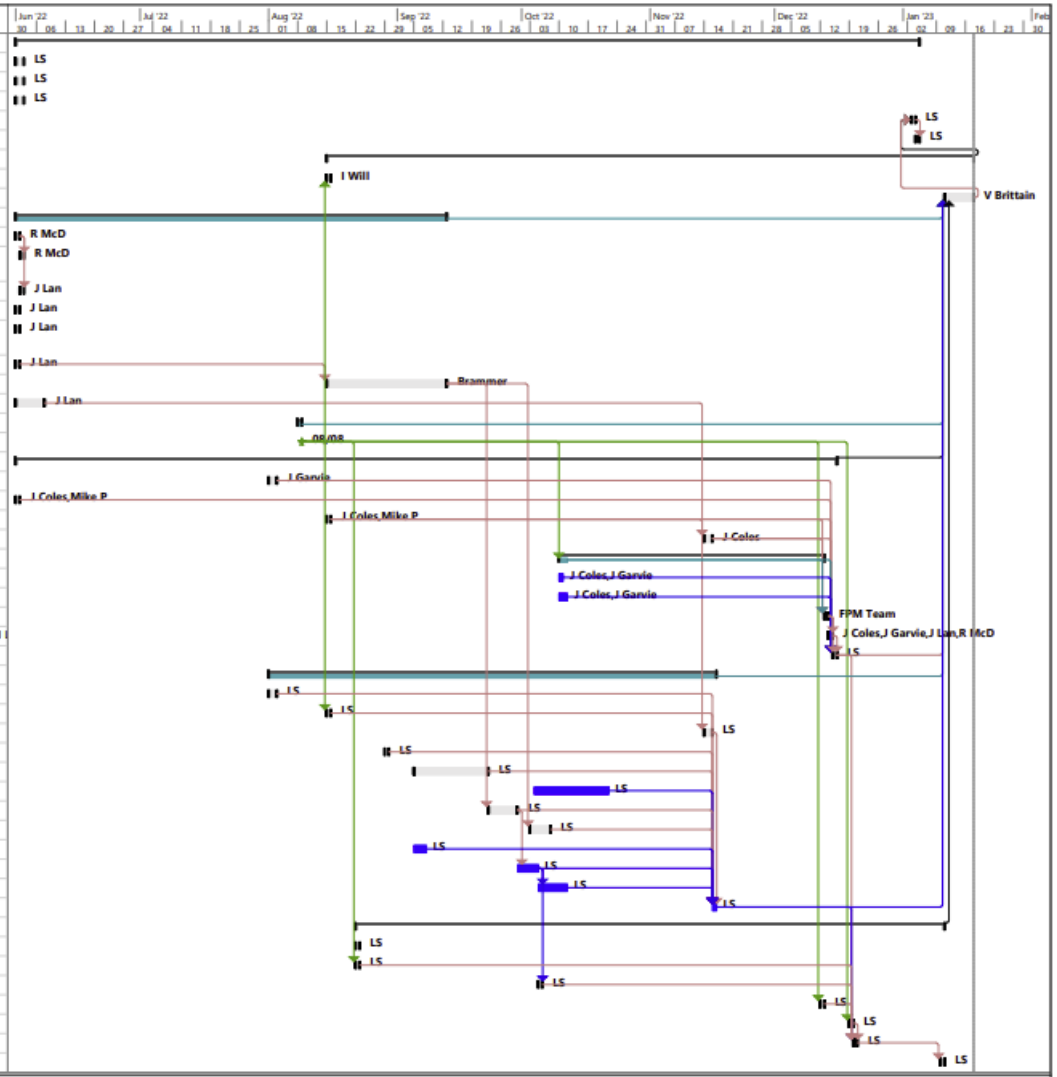
Due to the main project manager no longer working in maintenance, there may not always be time to install the required equipment to the press. As a result, some assistance from the maintenance team may be required.

A company will be required to move the press from the lorry that it gets delivered to the Mint on, to the correct location in the production area. These must be liaised with to ensure the press is moved safely, without causing significant unnecessary disruption to the plant.

6.2 Gantt Chart

Project Gantt Chart

ID	Task Name	Duration	Start	Finish	Resource Names
1	**MOC**	**156 days**	**Wed 01/06/22**	**Wed 04/01/23**	
2	MOC initial request to be raised & Signed	2 days	Wed 01/06/22	Thu 02/06/22	LS
3	Physical Change to be completed	2 days	Wed 01/06/22	Thu 02/06/22	LS
4	Process Change to be completed	2 days	Wed 01/06/22	Thu 02/06/22	LS
5	MOC Closure to be signed	1 day	Tue 03/01/23	Tue 03/01/23	LS
6	Press Handover	1 day	Wed 04/01/23	Wed 04/01/23	LS
7	**Safety**	**112 days**	**Mon 15/08/22**	**Tue 17/01/23**	
8	Asbestos Removal	1 day	Mon 15/08/22	Mon 15/08/22	I Will
9	Operational RA & SOP to be Completed	5 days	Wed 11/01/23	Tue 17/01/23	V Brittain
10	**Procurement**	**74 days**	**Wed 01/06/22**	**Mon 12/09/22**	
11	Project Approval (PJ# Release)	1 day	Wed 01/06/22	Wed 01/06/22	R McD
12	Order Placed for purchase of press & Conveyor	1 day	Thu 02/06/22	Thu 02/06/22	R McD
13	Order placed for B&P Transportation	1 day	Thu 02/06/22	Thu 02/06/22	J Lan
14	Hotel & Car booked for decomissioning	1 day	Wed 01/06/22	Wed 01/06/22	J Lan
15	Order Placed for Omega to Remove Asbestos	1 day	Wed 01/06/22	Wed 01/06/22	J Lan
16	Orders placed for electrical components	1 day	Wed 01/06/22	Wed 01/06/22	J Lan
17	Delivery of Electrical parts	21 days	Mon 15/08/22	Mon 12/09/22	Brammer
18	Order Cable / Pipework for Supplies	5 days	Wed 01/06/22	Tue 07/06/22	J Lan
19	**Trasportation**	**1 day**	**Mon 08/08/22**	**Mon 08/08/22**	
20	Delivery of press to TRM	0 days	Mon 08/08/22	Mon 08/08/22	B&P / LS
21	**Mechanical**	**142 days**	**Wed 01/06/22**	**Thu 15/12/22**	
22	Decomissioning of MPU200 @ Pobjoy	2 days	Mon 01/08/22	Tue 02/08/22	J Garvie
23	Parts list collated for procurement	1 day	Wed 01/06/22	Wed 01/06/22	J Coles,Mike P
24	Shroud build	1 day	Mon 15/08/22	Mon 15/08/22	J Coles,Mike P
25	Connect Services	2 days	Mon 14/11/22	Tue 15/11/22	J Coles
26	**Double Strike Mods**	**46 days**	**Mon 10/10/22**	**Mon 12/12/22**	
27	Cam, Sprocket & Gear Change	1 day	Mon 10/10/22	Mon 10/10/22	J Coles,J Garvie
28	Blank Feed Mods	2 days	Mon 10/10/22	Tue 11/10/22	J Coles,J Garvie
29	Oil, FPM & Stat	1 day	Tue 13/12/22	Tue 13/12/22	FPM Team
30	Comissioning / Test Run	1 day	Wed 14/12/22	Wed 14/12/22	J Coles,J Garvie,J L
31	Sign off	1 day	Thu 15/12/22	Thu 15/12/22	LS
32	**Electrical**	**78 days?**	**Mon 01/08/22**	**Wed 16/11/22**	
33	Decomissioning of MPU200 @ Pobjoy	2 days	Mon 01/08/22	Tue 02/08/22	LS
34	Build Shroud	1 day	Mon 15/08/22	Mon 15/08/22	LS
35	Connect Services	2 days	Mon 14/11/22	Tue 15/11/22	LS
36	IP2X Assesment	1 day	Mon 29/08/22	Mon 29/08/22	LS
37	Wiring Diagrams to be Produced & Verified	14 days	Mon 05/09/22	Thu 22/09/22	LS
38	PLC & HMI Programming	14 days	Tue 04/10/22	Fri 21/10/22	LS
39	Safety Panel Build	5 days	Fri 23/09/22	Thu 29/09/22	LS
40	Safety & Door Switches Installation	5 days	Mon 03/10/22	Fri 07/10/22	LS
41	IP2X Fix's	3 days	Mon 05/09/22	Wed 07/09/22	LS
42	Fitting of Safety Panel	3 days	Fri 30/09/22	Tue 04/10/22	LS
43	Comission & Test	5 days	Wed 05/10/22	Tue 11/10/22	LS
44	Sign Off	1 day?	Wed 16/11/22	Wed 16/11/22	LS
45	**Compliance**	**102 days**	**Mon 22/08/22**	**Tue 10/01/23**	
46	Design Review to be completed	1 day	Mon 22/08/22	Mon 22/08/22	LS
47	ISO 12100 Assesment (Initial RA)	1 day	Mon 22/08/22	Mon 22/08/22	LS
48	BS EN 60204 Assesment (Panel Wiring)	1 day	Wed 05/10/22	Wed 05/10/22	LS
49	ISO 16092 Assesment (Power Press)	1 day	Mon 12/12/22	Mon 12/12/22	LS
50	BS EN 14120 Assesment (Guarding)	1 day	Mon 19/12/22	Mon 19/12/22	LS
51	PUWER Assesment	1 day	Tue 20/12/22	Tue 20/12/22	LS
52	Stat Inspection	1 day	Tue 10/01/23	Tue 10/01/23	LS



Project: SNOG Timeline
Date: Wed 04/05/22

Task | Split | Milestone | Summary | Project Summary | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress

Page 1

Table 2 - Project Gantt Chart

7. Reference List

[1] D. Trust, “The Royal Mint, A Dogs Trail,” [Online]. Available: https://adogstrail.org.uk/sponsors/the-royal-mint/. [Accessed 28 04 2022].

[2] ISO, “International Organization for Standardization,” ISO, [Online]. Available: https://www.iso.org/home.html. [Accessed 27 04 2022].

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[4] I. E. C. (IEC), “IP Ratings,” IEC, 2022. [Online]. Available: https://www.iec.ch/ip-ratings. [Accessed 03 05 2022].

[5] ISO, “ISO 13849-1:2015(en) Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design,” ISO.org, 2015. [Online]. Available: https://www.iso.org/obp/ui/#iso:std:iso:13849:-1:ed-3:v1:en. [Accessed 28 04 2022].

[6] A. K. M. K. T. A. Azza Allouch, “Qualitative and Quantitative Risk Analysis and Safety Assessment of Unmanned Aerial Vehicles Missions over the Internet,” April 2019. [Online]. Available: https://www.researchgate.net/figure/Risk-Graph-for-Determining-the-Required-Performance-Level-for-a-Safety-Function-from-ISO_fig1_332590254. [Accessed 28 04 2022].

[7] “The Supply of Machinery (Safety) Regulations 2008, Schedule 2, Regulation 2(2), 1.2.4.3 Emergency Stop,” Legislation.gov.uk, 2008. [Online]. Available: https://www.legislation.gov.uk/uksi/2008/1597/schedule/2/made#:~:text=The%20emergency%20stop%20function%20must,not%20a%20substitute%20for%20them.. [Accessed 28 04 2022].

[8] T. I. o. E. a. T. a. BSI, Requirements for Electrical Installations, Croydon, UK: Institute of Engineering and Technology, 1018.

[9] T. R. Mint, “Britannia 2022 1 oz Silver Bullion Coin,” 2022. [Online]. Available: https://www.royalmint.com/invest/bullion/bullion-coins/silver-coins/britannia-2022-1-oz-silver-bullion-coin/. [Accessed 28 04 2022].

[10] B. P. Mint, “Home Page,” [Online]. Available: https://www.pobjoy.com/. [Accessed 28 04 2022].

[11] TheIET, “BS 7671:2018 MODEL FORMS,” 2 July 2018. [Online]. Available: https://electrical.theiet.org/media/2218/bs_7671_2018-model_forms-all.pdf. [Accessed 03 05 2022].

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

PG2 / E1 FORM

APPLICATION FOR ETHICAL APPROVAL

In order for research to result in benefit and minimise risk of harm, it must be conducted ethically. A researcher may not be covered by the University's insurance if ethical approval has not been obtained prior to commencement.

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

Ethical approval is not required for routine audits, performance reviews, quality assurance studies, testing within normal educational requirements, and literary or artistic criticism.

Please read the notes for guidance before completing ALL sections of the form.

This form must be completed and approved prior to undertaking any research activity. Please see Checklist for details of process for different categories of application.

Delete the Guidance Notes at the end of the form BEFORE submitting your application

SECTION A: About You (Principal Researcher)

1	Full Name:					
2	Tick all boxes which apply:		Member of staff:	☐	Honorary research fellow:	☐
3	Undergraduate Student	☒	Taught Postgraduate Student	☐	Postgraduate Research Student	☐

4	Institute/Academic Discipline/Centre:	University of Wales Trinity Saint David
5	Campus:	IQ Campus
6	E-mail address:	lscam1996@gmail.com
7	Contact Telephone Number:	07930588501
	For students:	
8	Student Number:	2017986
9	Programme of Study:	BEng Electrical and Electronic Engineering
10	Director of Studies/Supervisor:	Stephen Mosey, Gary Jones

SECTION B: Approval for Research Activity

1	Has the research activity received approval in principle? (please check the Guidance Notes as to the appropriate approval process for different levels of research by different categories of individual)		YES	☒	NO ☐
					Date
2	If Yes, please indicate source of approval (and date where known): ***Approval in principle must be obtained from the relevant source prior to seeking ethical approval***	Research Degrees Committee		☐	
3		Institute Research Committee		☐	
4		Other (write in)		☒	**Lecturer**

SECTION C: Internal and External Ethical Guidance Materials

	Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines.	
1	**UWTSD Research Ethics & Integrity Code of Practice**	☒
2	**UWTSD Research Data Management Policy**	☒
3		☐

SECTION D: External Collaborative Research Activity

1	Does the research activity involve collaborators outside of the University?		YES	☒	NO	☐
2	If Yes, please provide the name of the external organisation and name and contact details for the main contact person and confirmation this person has consented to their personal data being shared.as part of this collaboration.					
3	Institution	The Royal Mint				
4	Contact person name	Ricky Mcdonnell				
5	Contact person e-mail address	Ricky.mcdonnell@royalmint.com				
6	Has this individual consented to sharing their details on this form?		YES	☒	NO	☐
7	Are you in receipt of a KESS scholarship?		YES	☐	NO	☒
8	Is your research externally funded		YES	☒	NO	☐
9	Are you specifically employed to undertake this research in either a paid or voluntary capacity?	Voluntary	YES	☐	NO	☐
10		Employed	YES	☒	NO	☐
11	Is the research being undertaken within an existing UWTSD Athrofa Professional Learning Partnership (APLP)	If YES then the permission question below does not need to be answered.	YES	☐	NO	☒
12	Permission to undertake the research has been provided by the partner organisation	(If YES attach copy) If NO the application cannot continue	YES	☒	NO	☐

Where research activity is carried out in collaboration with an external organisation

13	Does this organisation have its own ethics approval system?	YES	☐	NO	☒
14	If Yes, please attach a copy of any final approval (or interim approval) from the organisation				

SECTION E: Details of Research Activity

1	Indicative title:	New Press Install		
2	Proposed start date:	August 2022	Proposed end date:	December 2022
3	**Introduction to the Research (maximum 300 words)** **Ensure that you write for a Non-Specialist Audience when outlining your response to the three points below:** • *Purpose of Research Activity* • *Proposed Research Question* • *Aims of Research Activity* • *Objectives of Research Activity* Demonstrate, briefly, how **Existing Research** has informed the proposed activity and explain • *What the research activity will add to the body of knowledge* • *How it addresses an area of importance.*			
4	**Purpose of Research Activity** To install a press in the shop floor at The Royal Mint (second hand), and upgrade it's safety system to ensure it meets modern safety standards. (this box should expand as you type)			
5	**Research Question** Can it be completed far cheaper than the price of a new press, and does the performance match? (this box should expand as you type)			
6	**Aims of Research Activity** To increase the production capacity of the business, and reduce costs by using cheaper alternatives to buying new equipment. (this box should expand as you type)			
7	**Objectives of Research Activity** To successfully upgrade a 1980s machine to modern safety standards and allow it to perform on par with modern equivalents. (this box should expand as you type)			
8	**Proposed methods (maximum 600 words)** Provide a brief summary of all the methods that **may** be used in the research activity, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed.			
9	There will be extensive studies of what regulations and standards will have an effect on this project. There will also be a large amount of research during the design and development stage as the safety system must perform as reliably and have performance that matches modern equipment, whilst			

	being substantially cheaper. The best components that fit within the budget must be sourced, ordered and built, with a design that performs effectively for the application. (this box should expand as you type)

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10	**Location of research activity** Identify all locations where research activity will take place.
11	The Royal Mint (this box should expand as you type)
12	**Research activity outside of the UK** If research activity will take place overseas, you are responsible for ensuring that local ethical considerations are complied with and that the relevant permissions are sought. Specify any local guidelines (e.g. from local professional associations/learned societies/universities) that exist and whether these involve any ethical stipulations beyond those usual in the UK (provide details of any licenses or permissions required). Also specify whether there are any specific ethical issues raised by the local context in which the research activity is taking place, for example, particular cultural and/or legal sensitivities or vulnerabilities of participants.
13	*(this box should expand as you type)*

14	Use of documentation not in the public domain: Are any documents **NOT** publicly available?	**NO**	☒
		YES	☐
15	If Yes, please provide details here of how you will gain access to specific documentation that is not in the public domain and that this is in accordance with prevailing data protection law of the country in question and England and Wales. *(this box should expand as you type)*		

SECTION F: Scope of Research Activity

1	**Will the research activity include:**	**YES**	**NO**
2	Use of a questionnaire or similar research instrument?	☐	☒
3	Use of interviews?	☐	☒
4	Use of diaries?	☐	☒
5	Participant observation with their knowledge?	☐	☒
6	Participant observation without their knowledge?	☐	☒
7	Use of video or audio recording?	☐	☒
8	Access to personal or confidential information without the participants' specific consent?	☐	☒
9	Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive?	☐	☒
10	Performance of any acts which may cause embarrassment or affect self-esteem?	☐	☒
11	Investigation of participants involved in illegal activities?	☐	☒
12	Use of procedures that involve deception?	☐	☒
13	Administration of any substance, agent or placebo?	☐	☒
14	Working with live vertebrate animals?	☐	☒

15	Other primary data collection methods, please explain in this box For example, 'focus groups'. Please indicate the type of data collection method(s) in this box and tick the accompany box.		
16	Details of any other primary data collection method: (this box should expand as you type)	☐	☒

If NO to every question, then the research activity is (ethically) low risk and **may** be exempt from **some** of the following sections (please refer to Guidance Notes).

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

SECTION G: Intended Participants

1	**Who are the intended participants:**	YES	NO
2	Students or staff at the University?	☐	☒
3	Adults (over the age of 18 and competent to give consent)?	☐	☒
4	Vulnerable adults?	☐	☒
5	Children and Young People under the age of 18? (Consent from Parent, Carer or Guardian will be required)	☐	☒
6	Prisoners?	☐	☒
7	Young offenders?	☐	☒
8	Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper?	☐	☒
9	People engaged in illegal activities?	☐	☒
10	Others (please identify specifically any group who may be unable to give consent) please indicate here and tick the appropriate box.		
11	Other – please indicate here: (this box should expand as you type)	☐	☒

12	**Participant numbers and source** Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited?	
13	How many participants are expected?	N/A *(this box should expand as you type)*
14	Who will the participants be?	N/A *(this box should expand as you type)*
15	How will you identify the participants?	N/A *(this box should expand as you type)*

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16	**Information for participants:**	YES	NO	N/A
17	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	☐	☐	☒
18	Will you tell participants that their participation is voluntary?	☐	☐	☒
19	Will you obtain written consent for participation?	☐	☐	☒
20	Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)?	☐	☐	☒
21	If the research is observational, will you ask participants for their consent to being observed?	☐	☐	☒
22	Will you tell participants that they may withdraw from the research at any time and for any reason?	☐	☐	☒
23	With questionnaires, will you give participants the option of omitting questions they do not want to answer?	☐	☐	☒
24	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	☐	☐	☒
25	Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken?	☐	☐	☒
26	If NO to any of above questions, please give an explanation			
27	*(this box should expand as you type)*			

28	**Information for participants:**	YES	NO	N/A
29	Will participants be paid?	☐	☐	☒
30	Is specialist electrical or other equipment to be used with participants?	☐	☐	☒
31	Are there any financial or other interests to the investigator or University arising from this study?	☐	☐	☒
32	Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims?	☐	☐	☒
33	If YES to any question, please provide full details			
34	*(this box should expand as you type)*			

SECTION H: Anticipated Risks

1	**Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.** If you have completed a full risk assessment (for example as required by a laboratory, or external research collaborator) you may append that to this form.		
2	**Full risk assessment completed and appended?**	**Yes**	☐
		No	☒
3	**Risks to participants** For example: emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information		
4	Risk to Participant: N/A *(this box should expand as you type)*	*How will you mitigate the Risk to Participant* *(this box should expand as you type)*	

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5	If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities	
	(this box should expand as you type)	
6	**Risks to investigator** For example: personal safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest	
	Risk to Investigator: Health and safety risks (electrical work, hand tools, power tools, working near other employees, fork lift trucks nearby). *(this box should expand as you type)*	*How will you mitigate the Risk to Investigator:* Complete a risk assessment before beginning any installation tasks. Notify others nearby when work is being carried out. *(this box should expand as you type)*
7	**University/institutional risks** For example: adverse publicity, financial loss, data protection	
	Risk to University: Data Protection If lecturers visit the Royal Mint, there are risks present in an industrial setting. *(this box should expand as you type)*	*How will you mitigate the Risk to University:* Follow the university's data protection and management guidelines. Complete risk assessment before allowing lecturers on site. *(this box should expand as you type)*

8	**Disclosure and Barring Service**			
9	If the research activity involves children or vulnerable adults, a Disclosure and Barring Service (DBS) certificate must be obtained before any contact with such participants.	**YES**	**NO**	**N/A**
10	Does your research require you to hold a current DBS Certificate?	☐	☒	☐

SECTION I: Feedback, Consent and Confidentiality

1	**Feedback** What de-briefing and feedback will be provided to participants, how will this be done and when?
	N/A *(this box should expand as you type)*
2	**Informed consent** Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded in accordance with prevailing data protection legislation.
	N/A *(this box should expand as you type)*
3	**Confidentiality / Anonymity** Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case.
	N/A

	(this box should expand as you type)

SECTION J: Data Protection and Storage

In completing this section refer to the University's Research Data Management Policy and the extensive resources on the University's Research Data Management web pages (http://uwtsd.ac.uk/library/research-data-management/).

1	Does the research activity involve personal data (as defined by the General Data Protection Regulation 2018 "GDPR" and the Data Protection Act 2018 "DPA")?	**YES**	**NO**
	"Personal data" *means any information relating to an identified or identifiable natural person ("data subject"). An identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person.*	☐	x
2	If YES, provide a description of the data and explain why this data needs to be collected:		
	(this box should expand as you type)		
3	Does it involve special category data (as defined by the GDPR)?	**YES**	**NO**
	"Special category data" *means sensitive personal data consisting of information as to the data subjects' –* *(a) racial or ethnic origin,* *(b) political opinions,* *(c) religious beliefs or other beliefs of a similar nature,* *(d) membership of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992),* *(e) physical or mental health or condition,* *(f) sexual life,* *(g) genetics,* *(h) biometric data (as used for ID purposes),*	☐	x
4	If YES, provide a description of the special category data and explain why this data needs to be collected:		
	(this box should expand as you type)		

5	Will the research activity involve storing personal data and/or special category data on one of the following:	**YES**	**NO**
6	Manual files (i.e. in paper form)?	☒	☐
7	University computers?	☐	☒
8	Private company computers?	☒	☐
9	Home or other personal computers?	☒	☐
10	Laptop computers/ CDs/ Portable disk-drives/ memory sticks?	☒	☐
11	"Cloud" storage or websites?	☒	☐
12	Other – specify:	☐	☒

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13	For all stored data, explain the measures in place to ensure the security of the data collected, data confidentiality, including details of password protection, encryption, anonymisation and pseudonymisation:		
	The Royal Mint has procedures in place for data protection which will be followed. All memory sticks are kept in a locked drawer. All data is password protected. *(this box should expand as you type)*		
14	**All Data Storage**		
15	Will the research activity involve any of the following activities:	**YES**	**NO**
16	Electronic transfer of data in any form?	☒	☐
17	Sharing of data with others at the University?	☐	☒
18	Sharing of data with other organisations?	☐	☒
19	Export of data outside the European Union or importing of data from outside the UK?	☐	☒
20	Use of personal addresses, postcodes, faxes, emails or telephone numbers?	☐	☒
21	Publication of data that might allow identification of individuals?	☐	☒
22	Use of data management system?	☐	☒
23	Data archiving?	☐	☒
24	If YES to any question, please provide full details, explaining how this will be conducted in accordance with the GDPR and DPA (and/or any international equivalent):		
	All data is kept within the Royal Mint on password protected cloud storage and memory sticks. Memory sticks will be password protected and kept in a locked drawer. *(this box should expand as you type)*		
25	List all who will have access to the data generated by the research activity:		
	Leon Scammell Ricky Mcdonnell *(this box should expand as you type)*		
26	List who will have control of, and act as custodian(s) for, data generated by the research activity:		
	Leon Scammell Ricky Mcdonnell *(this box should expand as you type)*		
27	Give details of data storage arrangements, including security measures in place to protect the data, where data will be stored, how long for, and in what form. Will data be archived – if so how and if not why not.		
	Data will be stored safely in a locked drawer in the Royal Mint. The data will be backed up on the company's cloud and password protectedS. *(this box should expand as you type)*		
28	Please indicate if your data will be stored in the UWTSD Research Data Repository (see https://researchdata.uwtsd.ac.uk/). If so please explain. (*Most relevant to academic staff)*		
	No		

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	(this box should expand as you type)		
29	Confirm that you have read the UWTSD guidance on data management (see https://www.uwtsd.ac.uk/library/research-data-management/)	YES	☒
		NO	☐
30	Confirm that you are aware that you need to keep all data until after your research has completed or the end of your funding	YES	☒
		NO	☐

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SECTION K: Declaration

31	The information which I have provided is correct and complete to the best of my knowledge. I have attempted to identify any risks and issues related to the research activity and acknowledge my obligations and the rights of the participants. In submitting this application I hereby confirm that I undertake to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice which is published on the website: https://www.uwtsd.ac.uk/research/research-ethics/		
	Signature of applicant:		**Date: 03/05/2022**

For STUDENT Submissions:

32	Director of Studies/Supervisor:		**Date:**
33	Signature:		

For STAFF Submissions:

34	Academic Director/ Assistant Dean:		**Date:**
35	Signature:		

Checklist: Please complete the checklist below to ensure that you have completed the form according to the guidelines and attached any required documentation:

☒	I have read the guidance notes supplied before completing the form.
☒	I have completed **ALL RELEVANT** sections of the form in full.
☒	I confirm that the research activity has received approval in principle
☒	I have attached a copy of final/interim approval from external organisation (**where appropriate**)
☐	I have attached a full risk assessment (and have NOT completed Section H of this form) (where appropriate) *ONLY TICK IF YOU HAVE **ATTACHED A FULL RISK ASSESSMENT***
☒	I understand that it is my responsibility to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice.
☒	I understand that before commencing data collection all documents aimed at respondents (including information sheets, consent forms, questionnaires, interview schedules etc.) must be confirmed by the DoS/Supervisor, module tutor or Academic Director.
☒	I have deleted the guidance notes before submitting the PG2 for consideration

RESEARCH STUDENTS AND STAFF ONLY
All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk , with the title 'Ethical Approval' followed by your name.
You will be informed of the outcome of your claim by email; therefore it is important that you check your University and personal email accounts regularly.

STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader.

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This form is available electronically from the Academic Office web pages:
https://www.uwtsd.ac.uk/academic-office/appendices-and-forms/

Application Process

All staff research projects and all research students must submit the Ethical Approval Form to the **University Research Ethics Committee** via the Academic Office (pgresearch@uwtsd.ac.uk). Staff research directly in relation to personal study for taught undergraduate or Masters programmes should be submitted via the Institute procedures explained below.

Taught masters and taught undergraduate research Ethical Approval Forms are considered **within Institutes.** Institutes will provide details of the specific processes for this. Where the Ethical issues within any single ethical application are of particular concern the Institute will refer these to the University Research Ethics Committee. Any student activity that involves the collection of primary data needs to undergo Ethical approval, this includes assignment work as well as dissertations.

Notes for guidance in completion of this form

Section A: About You
Please complete all relevant sections

Section B: Approval for research activity
Research proposals must be approved in principle before applying for Ethical Approval. The proposal approval only becomes final when the ethical approval is received.

The process for proposal approval varies according the individual and programme of study:

- Research students, by application on form PG1 to the Research Degrees Committee
- Taught students by review of research proposal within Institutes (Institutes provide specific details of these processes)
- Staff, by agreement by the Academic Director/Assistant Dean

Section C: External Ethical Guidance materials
Many discipline areas are required to operate with the discipline specific codes of research ethics (for example health, psychology, education etc.), any such codes must be listed and you must tick to confirm that you have consulted with these.

Section D: External Collaborative Research Activity
Provide details of the external collaborative partners, where appropriate you might want to submit a copy of the external collaboration agreement with the Ethical Approval Form. If the partner requires the research to be subject to its own internal Ethical approval process then please provide details of that process and a copy of any final (or interim) approvals received from the organisation.

Section E: Details of Research Activity
Remember that the individuals reviewing this Ethical Approval Form may not have seen your research proposal, and also may not be experts in the specific area of your research. The information provided should therefore be jargon free and clearly stated.

Indicative Title: please use the same title as used on the research proposal.

Purpose: the Ethical approval process will want to ensure that the methods you propose are adequate and appropriate to address the research aims and objectives. Excessive additional data collection can be seen as unethical.

Proposed Methods: the Ethical approval process seeks to ensure that you understand the methods that are intended, and that the implementation of those methods will be appropriate and without unnecessary impact on respondents. This section must explain how the methods described will lead to the collection of necessary and sufficient data, but not excessive data. Please be specific.

Location: this needs to mention geographical location and also local situation (for example, within Local Authority Offices in Cardiff, using a private room but close to other individuals). If you are collecting data within an organisational setting then you need to explain the permissions that you have obtained to do this.

Research Activity outside of the UK: please complete this section in detail, and note any guidance you have received. Also describe your own familiarity (or not) with the location that you will be utilising.

Section F: Scope of Research Activity
Please tick ALL of the research activities that might be undertaken. If any additional types of activity are intended then please add an extra box and describe these.

If you have answered no to all questions in F then sections G and I do not need to be completed. . Signatures are still required in section K.

Section G: Intended Participants
Please tick all categories that might apply.

Numbers & Source: if you are using a series of different methods or research activities please list numbers for each stage/phase. Be clear about how you will find respondents. Will you use intermediaries, and if so how? How will you ensure compliance with your sampling strategy?

Information for participants: all participants should be appropriately informed about the research, what is expected of them and what will happen to the information that they provide. The Ethical review process does not ask to see this documentation, but requires this to be reviewed and approved by the Director of Studies in the case of research students, the supervisor/module tutor in relation to students on taught programmes and the Academic Director/Assistant Dean in relation to staff research.

Section H: Anticipate Risks
All research carries some level of risk. The answers you provide to questions in this section will be reviewed to ensure that you have an appropriate understanding of the type of risks involved and how you can mitigate against these risks. If you have completed a full risk assessment, as required for example for laboratory work, field work, clinical tests, diving operations, or by a collaborative partner, you may append that to this form. In that case, please tick the box indicating this has been provided. You will not then be required to complete Section H.

Risk to participants Think very carefully about how your actions/questions/discussions might affect the people you are involving as participants. You might identify the risk as small but it would still be a risk. Many types of question have the potential to make respondents less content with their life / job; you need to recognise and try to ameliorate any such effects
If these are business owners, time with you may reduce profit.
In some locations physical risk is very real to both participants and yourself, please consider this.

Risk to you, the researcher Think about where you will meet people, if there are any dangers involved in the location. If you are meeting people as individuals think about using a public place. In general do not visit people in their own homes or remote locations. If you are talking to individuals about certain issues think about how their responses might affect you emotionally. What about the risk of collecting insufficient data?

Risk to the University When undertaking your research, you are acting as a member of the University (student or staff). Professionalism is important, so it is important to be well organised and well prepared. Punctuality, clarity etc. are all part of this. What will you do to ensure this? You must ensure you do not harm the good name of the University in any way and do nothing to undermine the reputation of the research it conducts and sponsors. Upholding high standards of conduct and integrity are vital in this regard. You must also conduct the research in such a way to minimise the potential for claims of negligence made against the University, its researchers and any collaborating individual or organisation. In this respect you should always comply with ethical, legal and professional frameworks, obligations and standards as required by statutory and regulatory authorities, as well as the university's Research Integrity and Ethics Code of Practice. Research misconduct in this respect can take many forms, including:

- fabrication: making up results or other outputs (eg, artefacts) and presenting them as if they were real
- falsification: manipulating research processes or changing or omitting data without good cause
- plagiarism: using other people's material without giving proper credit
- failure to meet ethical, legal and professional obligations: for example failure to declare competing interests; misrepresentation of involvement or authorship; misrepresentation of interests; breach of confidentiality; lack of informed consent; misuse of personal data; and abuse of research subjects or material
- improper dealing with allegations of misconduct: failing to address possible infringements such as attempts to cover up misconduct and reprisals against whistle-blowers

Adverse Outcomes. Think carefully about the possibilities, and cover here

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Section I: Feedback, Consent and Confidentiality

Feedback to participants: outline your approach. Will interview transcripts be shared with respondents to check accuracy? Will summaries of questionnaire analysis be made available to respondents in some way? Will an overview report be provided? How and when?

Informed consent: Draft letter / e-mail / or heading (or footer) section of questionnaire must be approved by DoS/supervisor (if research student), supervisor/module tutor if taught student, or Academic Director / Assistant Dean if a member of staff.
Confidentiality/Anonymity. Explain clearly how you will ensure confidentiality and anonymity.

Section J: Data Protection and Storage
Before completing this section it is necessary to read the University's Research Data Management information. The questions that follow are designed to ensure compliance with the Data Protection Act as well as established research protocols.

Many research activities will involve electronic transfer of data and use of data management systems in the summarisation and analysis of data. You will need to explain these in relation to compliance with the Data Protection Act.

Think carefully about who will have access to your data, this will include supervisors and examiners. Also that a thesis will be made available via the University library and the British Library system. If you are seeking an access bar for a period of time after completion then mention it here. If you will provide a copy of your findings, or intend to give a presentation, to a facilitating/ supporting/accessing organisation then explain that in this section. But also think about the general principle of data sharing, as explained in the Research Data Management information.

In terms of storage of data please ensure security, and also mitigate against loss of data.

Section K: Declaration
Ensure the appropriate countersignatures have been provided
Look carefully at the checklist and ensure that you comply with and tick all that are relevant to your research.