Plan Overview

A Data Management Plan created using DMPonline

Title: Advanced Induction Technologies for Non-ferrous Metal Recovery

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Affiliation: University of Manchester

Funder: Engineering and Physical Sciences Research Council (EPSRC)

Template: EPSRC Data Management Plan Customised By: University of Manchester

Project abstract:

This research will investigate new magnetic induction methods, and combined physical/visual features and magnetic induction signatures to classify different non-ferrous metals for separation in materials recycling and recovery. We will be collecting data on the magnetic signature of various scrap metal fragments drawn from commercial waste streams, for example, shredded end-of-life-vehicles, whites goods, and electronic waste. By magnetic signature we refer to how the metal fragments scatter an excitation magnetic field varying at different frequencies. We will also collect data on the physical geometry and appearance of the fragments by taking images and 3D/2.5D. We will be generated data based on this source material using electromagnetic simulations, new numerical approximation methods, and statistical data-analysis (correlations, etc) and machine learning.

ID: 70204

Start date: 01-10-2021

End date: 30-09-2024

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Advanced Induction Technologies for Non-ferrous Metal Recovery

Manchester Data Management Outline

1. Will this project be reviewed by any of the following bodies (please select all that apply)?

- Funder

2. Is The University of Manchester collaborating with other institutions on this project?

- No – only institution involved

3. What data will you use in this project (please select all that apply)?

- Acquire new data

4. Where will the data be stored and backed-up during the project lifetime?

- Other storage system (please list below)

Online repositories.
Dropbox for business folder.

5. If you will be using Research Data Storage, how much storage will you require?

- Not applicable

6. Are you going to be working with a 3rd party data provider?

- No

7. How long do you intend to keep your data for after the end of your project (in years)?

- 11 - 20 years

Desktop machines. External hard-drive. Storage device such as CD. Online repository.
Data will likely be superseded by this time.

Questions about personal information

Personal information, also known as personal data, relates to identifiable living individuals. Special category personal data is more sensitive information such as medical records, ethnic background, religious beliefs, political opinions,

sexual orientation and criminal convictions or offences information. If you are not using personal data then you can skip the rest of this section.
Please note that in line with data protection law (the General Data Protection Regulation and Data Protection Act 2018), personal information should only be stored in an identifiable form for as long as is necessary for the project; it should be pseudonymised (partially de-identified) and/or anonymised (completely de—identified) as soon as practically possible. You must obtain the appropriate ethical approval in order to use identifiable personal data.

8. What type of personal information will you be processing (please select all that apply)?

- No sensitive or personal data

9. How do you plan to store, protect and ensure confidentiality of the participants' information (please select all that apply)?

- Other (please list below in less than 100 words)

Not applicable

10. If you are storing personal information (including contact details) will you need to keep it beyond the end of the project?

- Not applicable

11. Will the participants' information (personal and/or sensitive) be shared with or accessed by anyone outside of the University of Manchester?

- Not applicable

12. If you will be sharing personal information outside of the University of Manchester will the individual or organisation you are sharing with be outside the EEA?

- Not applicable

13. Are you planning to use the personal information for future purposes such as research?

- No

14. Who will act as the data custodian for this study, and so be responsible for the information involved?

Michael O'Toole

15. Please provide the date on which this plan was last reviewed (dd/mm/yyyy).

2021-01-26

Data Collection

What data will you collect or create?

Electromagnetic signatures and physical characteristics (material and geometry) of scrap metal fragments including the following:

- **Experimental data** derived from testing using precision measurement instruments (e.g. Solartron impedance analyser, Vector Network Analyzers (VNAs)); data acquisition hardware (e.g. Red Pitatya); and other relevant hardware as acquired through the lifespan of the project. Raw data from such testing will typically be outputted in csv files prior to processing for secondary outputs (e.g. graphical representations; testing reports).
- **Modelling/simulation/programming data** generated using multiphysics engineering simulation and finite element solver software including COMSOL Multiphysics; Python; Ansys and MATLAB. Tabular raw data will be outputted in csv and text files prior to graphical interpretation. Programme specific file types will be converted to compiled binary files (.exe).
- **Mechanical and electronic design data** from CAD packages including Solidworks and Solid Edge, Eagle, Altium. File types will be specific to each CAD package (e.g. .sldprt for Solidworks) but .STEP files will also be generated, a file type allowing transfer between different CAD packages for ease of data sharing.

How will the data be collected or created?

Experimental test rigs and measurements. Data collected and generated in this project will comprise those types of data outlined above. Each type of data will be generated using well-established methodological conventions as described in instrument and software manuals, the established literature and methodology formulated during the group's previous work in the area.

File formats: Multiple (+20). Main formats to include: .csv; .txt; .STEP; .sldprt; .exe

Software used: COMSOL Multiphysics; Python; Ansys; MATLAB; Solidworks; Microsoft Excel; GIT

Data volume: Estimated <8TB. Based on previous projects in this area, we do not envisage requiring any more capacity than the standard volume granted by the University of Manchester. We will monitor this throughout the lifespan of the project and contact our Research Data Management team at The University of Manchester should this aspect of the project change.

Documentation and Metadata

What documentation and metadata will accompany the data?

This project will employ the following metadata standards and data documentation:

- For any commercial or industry partners we will produce technical documentation outlining the methods used to generate, analyse and test the validity of the data generated. These will also be summarised in any publications related to the project.
- Standard operating procedures will be produced for any regularly repeated procedures, outlining naming conventions and data generation methodology, including programme instructions and the location of any raw data required.
- For data sharing we will produce explanatory metadata as commensurate with the size and nature of the data request.

Ethics and Legal Compliance

How will you manage any ethical issues?

The project will not collect any personal or sensitive date, or any information about persons whatsoever.

Given the nature of this research project, it is unlikely that the raw data would be suitable for sharing. However, the group will be happy to share secondary processed data (e.g. graphical representations/results tables) where we have already published in the public domain, there are no potential commercialisation or intellectual property issues, and any contractual obligations with the funder would not be compromised.

How will you manage copyright and Intellectual Property Rights (IPR) issues?

Data will be owned by the University. Data will be regularly reviewed for potential IP value and and best route for impact decided (free-share, patent) on a case by case basis.

We have an industrial contact collaborating with us on a related project (ID70203). We may share data with them under our license agreement.

They have offered support for this project without charge.

Storage and Backup

How will the data be stored and backed up during the research?

We will maintain data security internally by restricting access to the project's storage area to the UoM project staff following approval by the Principal Investigator.
The main risks to data security and their solutions comprise:

- **Unauthorised access to the data:** As above, only project members will be given access to the data on the storage area. Data processed on laptops will be carried out on password-protected UoM issued devices. Physical access to the offices in which data is processed are protected by either key code access restrictions; swipe card only entry; or locked offices.
- **Export control violation:** The UoM has a stringent system related to the sharing of data outside of the UK. If a situation arises where we would potentially be looking to take or share controlled data outside of the UK we would comply with the UoM regulations related to such data and maintain contact with the Export Controls office to formulate the safest course of action.
- **Breach of contract confidentially clauses:** As above, only project members will be given access to the data that has not been formally shared. Physical access to the offices in which data is processed are protected by either key code access restrictions; swipe card only entry; or locked offices.

How will you manage access and security?

Unless formally shared (e.g. by repository or by project team), access requires university account. Folder must be shared by agreement of PI or Co-investigators.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

Electromagnetic signatures, geometry and material properties may be of continuing interest and should be preserved.

What is the long-term preservation plan for the dataset?

While there are no formal preservation standards for this type of data, we plan to retain the data for <10 years from the project end date in the project's storage area (e.g. dropbox) or any subsequently approved University of Manchester data repository. This represents a feasible time period for which novel research and/or follow-up work may be undertaken using this project's data.

Data Sharing

How will you share the data?

We will evaluate data on a case-by-case basis for the method to deliver greatest impact and public good.
In most cases, this will mandate free sharing of data. This can be on request or via online repository, journal or data journal.
In some cases, this may mean retaining data for potential IP to support a technology translation activity.

Are any restrictions on data sharing required?

As above, in some cases data may be restricted to support IP and technology translation.

Responsibilities and Resources

Who will be responsible for data management?

1. Post-doctoral research associates employed on research contract. Supporting PhD student.
Data capture and collection. Short term storage and analysis.
2. Principal and co-investigators.
Data storage long-term. Distrubtion of data. Evaluation of data release.

What resources will you require to deliver your plan?

Dropbox for business.