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## Plan Overview

*A Data Management Plan created using DMPonline*

**Title:** Development of a commercially viable magneto-hydrodynamics thruster for spacecraft propulsion

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**Template:** DCC Template

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# **Development of a commercially viable magneto-hydrodynamics thruster for spacecraft propulsion**

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## **Data Collection**

**What data will you collect or create?**

| Type of data                         | Description                                                                                      | Formats                                                                                                                                                         | Reasoning                                                                                                                                                          | Volume of data |
|--------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| CAD model or assembly files          | for thruster design CAD modelling and analysis                                                   | .sldprt, .sldasm or .step                                                                                                                                       | the thruster will be designed in SolidWorks using .sldprt and .sldasm. At the end of the project, the final assembly will be saved as a non-proprietary .step file | 20GB           |
| MATLAB scripts                       | for thruster initial sizing and specification                                                    | .m files                                                                                                                                                        | this is the file format in MATLAB                                                                                                                                  | 15GB           |
| COMSOL Multiphysics simulation files | for thruster performance simulation (i.e. CFD and electrodynamics) analysis                      | .mph, .mphbin, .mphtxt, .mphphb                                                                                                                                 | standard file formats for COMSOL Multiphysics simulation                                                                                                           | 500GB          |
| Mesh geometry files                  | for thruster multiphysics, thermal and structural analysis                                       | .msh or .stl                                                                                                                                                    | universal file types for mesh files                                                                                                                                | 500GB          |
| NASTRAN structural simulation files  | for structural analysis of the thruster                                                          | .nas                                                                                                                                                            | standard file type for NASTRAN                                                                                                                                     | 500GB          |
| Ansys thermal simulation files       | for thermal analysis of the thruster                                                             | .rth, .wbdp, .anf, .wbpj, .wbpz, .wbex, .wbdb, .esav, .mntr, .rst, .mechdb, .emat, .axdt, .lgw, .osav, .engd, .mdef, .fedb, .meshdat, .ans, .dbb, .rfl, .rmg, . | standard file types for Ansys Workbench                                                                                                                            | 500GB          |
| Diagrams and image files             | for presenting pictures, graphs and other types of processed data in academic paper and writings | .png or .jpg                                                                                                                                                    | standard file type for images                                                                                                                                      | 15GB           |
| Video files                          | for recording and analysing thruster experimental performance                                    | .mp4                                                                                                                                                            | standard file type for videos                                                                                                                                      | 15GB           |
| Text and document files              | for documentation and write-ups                                                                  | .txt, .pdf, .docx                                                                                                                                               | standard file types for documents                                                                                                                                  | 500MB          |
| Spreadsheet files                    | for organising and presenting tabular data                                                       | .csv, .xlsx                                                                                                                                                     | standard file types for spreadsheets                                                                                                                               | 500MB          |

## How will the data be collected or created?

| Type of data                         | Naming convention                                                            |
|--------------------------------------|------------------------------------------------------------------------------|
| CAD model or assembly files          | YYYY_MM_DD_NameOfFile_ver stored in CAD folder                               |
| MATLAB scripts                       | YYYY_MM_DD_NameOfFile_ver stored in MATLAB scripts folder                    |
| COMSOL Multiphysics simulation files | YYYY_MM_DD_NameOfFile_ver stored in Multiphysics simulations folder          |
| Mesh geometry files                  | YYYY_MM_DD_NameOfFile_ver stored in Mesh geometry folder                     |
| NASTRAN structural simulation files  | YYYY_MM_DD_NameOfFile_ver stored in Structural simulations folder            |
| Ansys thermal simulation files       | YYYY_MM_DD_NameOfFile_ver stored in Thermal simulations folder               |
| Diagrams and image files             | YYYY_MM_DD_NameOfFile_ver stored in Images folder                            |
| Video files                          | YYYY_MM_DD_NameOfFile_ver stored in Video folder                             |
| Text and document files              | YYYY_MM_DD_NameOfFile_ver stored in Documentation or Papers or Thesis folder |
| Spreadsheet files                    | YYYY_MM_DD_NameOfFile_ver stored in data folder                              |

## Documentation and Metadata

### What documentation and metadata will accompany the data?

===== README FILE INFORMATION =====

# This file must be saved as a text file, ie extension .txt. You may need one for the whole dataset or one per subset/data file.

Readme.txt written by: [name]

Written on [YYYY-MM-DD]

===== DATASET INFORMATION =====

1. Directory/file naming conventions: explain any abbreviations in filenames or describe each file  
eg YYYY-MM-DD-INSTRUMENT-NAME, YYYY-MM-DD-ALGORITHM-NAME

... [repeat as needed]

2. Definitions of acronyms, abbreviations, or other project-specific terms used in file/folder names or documentation

Acronym/abbreviation:

Description:

... [repeat as needed]

3. Variables: units of measurement (also note any special formats used)

Name:

Description:

Units of measurement:

... [repeat as needed]

4. Variables: codes for missing data

Code:

Definition:

... [repeat as needed]

5. Column headings for tabular data

Full name (spell out abbreviated words):

Definition:

... [repeat as needed]

6. Date/date range of data collection

Eg YYYY-MM-DD to YYYY-MM-DD, or YYYY-MM to YYYY-MM

7. Geographic location of data collection

Eg city, country, coordinates

8. Additional format information

Eg specialised software (including version) used or needed to view the files

===== METHODOLOGY INFORMATION =====

9. General methodology (experimental, observational, simulation, etc.):

10. Method for processing data, if the dataset is not raw data:

11. Instruments used for collecting data:

12. Uncertainty, precision, and accuracy of measurements, if known:

13. Standards or calibrations that were used:

14. Quality assurance and quality control that have been applied, if applicable:

15. Any further relevant information eg known issues with the data, related datasets:

## **Ethics and Legal Compliance**

### **How will you manage any ethical issues?**

N/A: No personal or GDPR-sensitive data will be generated, collected or processed.

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

N/A: All data used will be located in the public domain or open source.

## **Storage and Backup**

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

All data used will be stored on a restricted access computer and automatically backed up onto Cranfield's OneDrive system.

### **How will you manage access and security?**

All data used or generated will be non-confidential and freely available to anyone if requested.

## **Selection and Preservation**

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

Thruster simulation set-up and results alongside thermal and structural analysis data. Also, manufacturing and assembly drawings together with experimental set-up and results documents.

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

If the project is successful and has commercial viability then the data will be stored in a private location.

## **Data Sharing**

### **How will you share the data?**

If the project is successful and has commercial viability then the data will not be shared with everyone.

### **Are any restrictions on data sharing required?**

If the project is successful and has commercial viability then the data will not be shared with everyone.

## **Responsibilities and Resources**

### **Who will be responsible for data management?**

Alexandru Uifalean, the PhD student.

**What resources will you require to deliver your plan?**

Software: MATLAB, NASTRAN, COMSOL, Ansys

Hardware: Thruster manufacturing and testing facilities (i.e. vibration table and TVAC)

Technical expertise: Thruster mechanical design, electromagnetism design, propulsion performance assessment