**Zeiss Xradia Versa 620 XRM - user application form**

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| Name:  Email: | Position:  Supervisor (if student): |
| University of Liverpool  Other Institution: | Department: |

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| Project title: |
| Please provide a short description of your project: |
| What does the Zeiss versa 620 offer to your research project that you cannot achieve with other methods or another X-ray CT instrument? |
| Which critical research question will the data from the Zeiss Versa allow you to answer? |
| How will this data contribute to your research publications or grant applications? |
| Does your project fit into one of our priority research areas of manufacturing, energy, or healthcare, and how? |
| How is this project funded?  Research grant / IRIS reference:  Knowledge exchange  Consultancy / CONSULT ref:  Other (give details) |
| University of Liverpool account code for charges: |

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| What material are your samples? |
| What size are your samples (height x length x width)? |
| What type of features inside the sample do you want to see? |
| What size are those features (height x length x width)? |
| Do you want to scan the whole sample, or a region of interest?  Whole sample  Region of interest |
| How many samples do you want to scan? |
| Are the sample hazardous?  No  Yes – biological risk  chemical risk  radioactive  other  (If yes, please also provide a risk assessment for sample handling) |
| Does your project require research ethics approval?  No  Yes  - Approval number: |

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| Do you require help with data processing/analysis?  No, I will do this myself (only require reconstructed volume)  Yes, I need help with segmenting and quantifying features  Yes, I need help with segmenting features and creating visualization images and videos |

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| How are the results going to be used and by when do you expect submission? |
| Publication Target date:  Grant application Target date:  Student thesis Target date:  Other Please give details: |

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| I agree to the Condition of Use (attached)  I agree to the storage of my details provided here for the purpose of processing my application: |

**Conditions for Use of the Zeiss Xradia Versa 620 (Shared Research Facility)**

Use the Zeiss Xradia Versa 620 is by application only. The applications are approved on a monthly basis by the Operation Management Team. The instrument has been acquired to support applications in the manufacturing, energy, and healthcare fields, and it is expected that applications for use come from these research areas.

The instrument is supported by a full-time member of technical staff, who will carry out scans, or provide instrument training and help, depending on the requirements of the specific project. The level of support required should be discussed at the time of application. All users will be able to come in and be present at the time of scanning, even when full instrument training is not needed.

Access to the instrument (whether for observation or independent use) requires a building induction for the Waterhouse Block C lab. Currently, also a Covid-19 induction is required before entering the building. These are currently carried out by the technical staff for the Albert Crewe Centre for Electron Microscopy.

**Sample requirements:**

Samples must be provided suitable for CT scanning. That includes:

* Samples must be safe to handle. A risk assessment must be provided for any hazardous samples, including CoSHH and BioCoSHH assessments where applicable. These should be provided together with the application for access and before bringing any samples into the facility.
* Samples must be of a size and shape suitable for scanning. They should be prepared ahead of the scan time, so that they can fit directly into the sample holder of the instrument.
* Liquid or fluid-containing samples, as well as all biological samples, must be encased in leak-proof containers.
* Samples must be collected directly after scanning. There is no sample storage provided, and samples cannot be kept outside of scanning hours. Disposal of samples is the responsibility of the sample owner.

**Scanning data storage:**

CT scanning creates large amounts of data. A typical scan creates datafiles between 5 GB and 50 GB. These files must be collected by the user immediately after scanning. Safe storage of the scanning data is the responsibility of the user. The facility will only keep the files for a short amount of time to ensure safe transfer to the user. A hard drive with enough space for the scanning data must be provided together with the sample. The hard drive must have been virus-scanned and should not contain any confidential or sensitive information.

**Data processing and analysis:**

The output from the X-ray CT scanner are the raw projection images and the reconstructed 3D data. This is a 3D grayscale image. Any further information, for example measurements of features, requires processing and analysis of this image with suitable 3D software. As a general rule, this is the responsibility of the user, however the member of technical staff will be able to advise and provide help and training for more common image processing problems. Image processing support should also be discussed and applied for at the time of application.

**Instrument training:**

Users that require more frequent access to the instrument will be provided with instrument training by the member of technical staff. This is usually carried out during the user’s first allocated scanning sessions on the instrument and with the samples the user wants to scan. Successful training leads to the ability to book and access the instrument independently. Instrument training is personalised, hands-on, and lasts until the user is able to operate the instrument in a safe, competent, and appropriate manner. Only the technical member of staff can provide out instrument training, not other users of the instrument. Prior to training, the risk assessment for the use of the Zeiss Xradia Versa 620 must be read and acknowledged by the user.

**Publications and acknowledgments:**

At a minimum, the use of the Zeiss Xradia Versa 620 SRF must be mentioned in the acknowledgements of any resulting publications. A sentence similar to the following should be used. "We acknowledge the use of the SRF Zeiss Xradia Versa 620 at the University of Liverpool under the EPSRC strategic equipment grant number EP/V007610/1". Co-authorship should be offered when one of the PIs, Co-PIs, or technical staff member have contributed more than routine use of the instrument. This includes developing on specific scanning, reconstruction, or sample preparation processes or extensive data processing such as creating measurements and visualisation images. Please also inform us of any publications and grants there were awarded where data from the instrument has contributed. Publications in the University’s Elements repository should be tagged with the Shared Research Facility used (here: "X Ray Microscope").

**Industrial access:**

The Zeiss Xradia Versa 620 is available for industrial use. Prior to use, a quotation setting out the work programme and deliverables must be obtained, and terms and conditions agreed with the University of Liverpool. A typical work programme includes scanning of samples, post-processing and analysis of the data, and provision of a report summarising results.