



**L-Università
ta' Malta**

**Human Resources
Management &
Development Office**

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Call for Applications (Call ID: 05/2022)

Post/s of Full-Time Research Support Officer I or II or III or IV

MaltaHIP-II - *Development of a Small Diameter Low-Wearing Hip Joint Prosthesis*
(TRAKE)

And any other projects undertaken by the Department of Metallurgy and Materials Engineering.

1. Applications are invited for a Research Support Officer (RSO) to work on a full-time basis on “Development of a Small Diameter Low-Wearing Hip Joint Prosthesis” (MaltaHIP-II), a project financed by the University of Malta through the Transdisciplinary Research and Knowledge Exchange Complex (TRAKE). The selected applicant will carry out research on the design and development of a MaltaHIP implant with the smallest size in the standard range, consisting of a cup diameter of 46 mm.

Refer to the recent publication <https://doi.org/10.1016/j.jmbbm.2021.105072> and the MaltaHIP PCT patent application <https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2020260206>

This work will focus on the product design using three-dimensional computer aided modelling with an industry-standard software package; advanced stress analysis using classical and numerical mechanics methods such as finite element analysis (with an industry-standard software package), fatigue testing, wear testing using an in-house built hip joint simulator and post-wear material characterisation. The work will be carried out by the Department of Metallurgy and Materials Engineering (Faculty of Engineering) in close collaboration with the Department of Anatomy (Faculty of Medicine and Surgery) and the Department of Mechanical Engineering (Faculty of Engineering) and with the support of two industrial partners – Mater Dei Hospital and EMPAV Engineering Ltd.

2. Applicants applying for the post must be in possession of a PhD/DPhil, Masters or Bachelors’ degree (2nd upper or higher) in Materials, Mechanical or Manufacturing engineering or a closely related discipline. A solid working knowledge of tribology, fracture mechanics and/or three-dimensional computer aided modelling together with advanced stress analysis using classical and numerical mechanics methods such as finite element analysis with a commercial state-of-the-art software will be considered an asset. The applicant must also show proof that he/she has an in depth understanding of the anatomy of the hip. Applicants with post-doc or postgraduate experience in one of the above-mentioned areas will be preferred. Any direct experience in research project work, design, modelling and simulation related or not related to biomechanics will be considered an asset. The applicant should be self-motivated and have the ability to work both independently and as part of a team. He/she must be able to organise and prioritise tasks within the project timeline to meet interim deadlines. He/she must also possess good written communication and academic writing skills.

The University of Malta is an Equal Opportunity employer.

3. The selected candidate must be living in Malta for the period of employment.
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4. Applicants with a Master or Bachelor's Degree will be required to apply for a full-time PhD in Mechanical Engineering of University of Malta under the supervision of Prof. Ing. Joseph Buhagiar. The PhD proposal will follow the project aims and objectives.
 5. The full-time post is for a period of 36 months for RSO I or II and 30 months for RSO III or IV and carries an initial annual remuneration of:
€20,800 for those in possession of a Bachelors' degree (Research Support Officer I);
€24,960 for those in possession of a Master's degree (Research Support Officer II);
€31,200 for those in possession of a PhD/DPhil (Research Support Officer III); and
€41,600 for those in possession of a PhD/DPhil with postdoctoral experience (Research Support Officer IV).
 6. Candidates must upload their covering letter, curriculum vitae, and certificates (certificates should be submitted in English) and at least one letter of reference **through this form** <https://www.um.edu.mt/hrmd/workatum-projects> by not later than **Tuesday, 8th February 2022**.
- Late applications will not be considered.**
7. Further information may be obtained by sending an email to joseph.p.buhagiar@um.edu.mt or from <https://www.um.edu.mt/hrmd/recruitment> and should you have any queries, please send us an email on projects.hrmd@um.edu.mt.

Office of the University,
Msida, 11th January 2022

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Further Information

1. The Research Support Officer will be responsible for the execution of a number of tasks related to MaltaHIP-II – Development of a Small Diameter Low-Wearing Hip Joint Prosthesis, a project financed by the University of Malta, in which the Department of Metallurgy and Materials Engineering is working in close collaboration with the Department of Mechanical Engineering and with the support of two industrial partners – Mater Dei Hospital and EMPAV Engineering Ltd.
2. The lifespan of a prosthetic hip joint is mostly limited by its vulnerability to wear. The applicants, through the MCST-funded project MaltaHIP (R&I-2015-023T), which terminated in March 2020, demonstrated that the MaltaHIP showed improved wear resistance over commercially available implants when tested in an accredited lab in Germany. To protect the invention, a Patent Cooperation Treaty (PCT/EP2020/067366) was filed in June 2020 [1]. The MaltaHIP was designed as a medium-sized prostheses with an acetabular cup diameter of 53 mm. To enhance its commercial viability, the design of the MaltaHIP should cater for the widest size range possible. Hence, the aim is to develop a MaltaHIP implant with the smallest size in the standard range, consisting of a cup diameter of 46 mm. This smaller diameter implies thinner polymeric components that are at a higher risk of failing by fatigue & fracture. The aim of the study is to identify the correct size proportions of the polymeric components that prevent failure by fatigue & fracture through synergistic multidisciplinary expertise in biomaterials, tribology, fracture mechanics, anatomy, orthopaedics, machining & simulation.

[1] <https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2020260206>

The main project objectives hence are:

- a. to assess the viability of developing a MaltaHIP implant with a 46 mm acetabular cup diameter, being the smallest in the standard size range. This needs to be done in a way that the hip implant still makes use of the original concept where the articulating motion is only linear as per filed PCT. This means that changes to the design need to be kept as a minimum.
- b. to verify that the smaller implant can take the biomechanical loads and is not susceptible to fatigue failure. This because, a small acetabular diameter would imply thinner polymeric components.

- c. to perform empirical experimental tests including fatigue so that the computer model can be verified. These tests will be performed on coupons made from UHMWPE and Cross-linked Polyethylene (subjected to gamma radiation between 0 to 100 kGy).
 - d. to manufacture single articulations of the MaltaHip which represent an acetabular cup of a 46 mm diameter and test them in a one-stage hip joint simulator that was built by the applicants and is available at the Faculty of Engineering. These prototypes will be tested for fatigue and wear.
3. The main duties and responsibilities of the appointee will consist of carrying out Research and Project Management Assistant duties including:
- a. working closely with the project collaborators and partners;
 - b. development and testing of a small diameter hip joint prosthesis based on the MaltaHIP concept;
 - c. producing project deliverables within the time frames specified by the project;
 - d. day-to-day project planning and management;
 - e. abiding by the conditions imposed by the project and call;
 - f. drafting and submitting at least two journal papers related to the project to an international journal;
 - g. presenting the results in at least one relevant international conference;
 - h. writing or assisting in the writing of proposals for further research grants;
 - i. assisting in dissemination and communication activities related to the project;
 - j. liaising with the Knowledge Transfer Office (KTO) with relation to the commercialisation of the MaltaHIP;
 - k. performing any other project-related tasks as instructed by the project coordinator
4. The appointees are expected to work at such places and during such hours as may be determined by the University authorities.
5. The selection procedure will involve:
- a. scrutiny of qualifications and experience claimed and supported by testimonials and/or certificates (copies to be included with the application);
 - b. shortlisting; and
 - c. an interview and / or extended interview.
6. The post is for a period of 30 or 36 months, which will be subject to a probationary period and to the provisions of the Statutes, Regulations and Bye-Laws of the University of Malta which are now or which may hereafter be in force.