Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*

1. Članica UL (*UL member)*:

Univerza v Ljubljani, Fakulteta za strojništvo

2. Ime, priimek in elektronski naslov mentorja/ice (*Mentor's name, surname and email*):

Izr.prof.dr. Davorin Kramar

3. Raziskovalno področje (*Research field*):

Moderne proizvodne in izdelovalne tehnologije s poudarkom na pametnih procesih in okolijskih odtisih / Advanced manufacturing and production technologies with a focus on smart processes and environmental footprints

4. Opis delovnega mesta mladega raziskovalca/ke (D*escription of the Young Researcher's position)*:
Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo:

Mladi raziskovalec, bo po potrditvi vključen v raziskovalno skupino Katedre za menedžment obdelovalnih tehnologij (Laboratorij za odrezavanje in Laboratorij za zagotavljanje kakovosti). Poleg študijskih obveznosti, bo sodeloval na industrijskih, domačih, ter evropskih raziskovalnih projektih, na katerih sodeluje oz. jih koordinira raziskovalna skupina. Tu bo možnost aktivne sodelave/izmenjave z drugimi mednarodnimi univerzami (Švedska, Francija, Španija, Avstrija, Nemčija, ZDA), s katerimi raziskovalna skupina tesno sodeluje.

Trajnostni razvoj, digitalizacija in umetna inteligenca se oblikujejo kot ključna raziskovalna področja, saj bo od razvoja visoko-zmogljivih obdelovalnih/izdelovalnih tehnologij in njihove praktične uporabe, odvisna bodoča konkurenčna prednost slovenskih proizvodnih podjetij pri zelenem prehodu in digitalizaciji. Raziskovalne vsebine in cilji skupine so tako usmerjeni v sprejemanje, prenos in raziskovalno podporo visoko-zmogljivih obdelovalnih tehnologij, med katere štejemo: inoviranje visoko-produktivnih izdelovalnih procesov, vpeljava orodij umetne inteligence za doseganje pametnih procesov, razvoj visoko preciznih mikro obdelav in doseganje sodobnih čistih načinov obdelave, uporaba tehnologij »big data«, itd. za katere je namenjen velik delež aktivnosti raziskovalne skupine. Program mladega raziskovalca bo tako usmerjen v tri potencialna področja:

- Razvoj inovativne metodologije karakterizacije obdelovalnosti z moderno senzoriko (Kistler, Dewesoft).
- Zajemanje »Big data« in uporaba umetne inteligence za karakterizacijo obdelovalnih procesov/strojev/izdelkov.
- LCA odrezovalnih procesov (čistost procesov, delovnega prostora, super maziva na vodni osnovi, itd.)

Področja so široka in primerna tudi za študente, ki so zaključili magistrski študij strojništva, elektrotehnike, kemije, itd.

Za delo je v laboratoriju zagotovljen širok nabor raziskovalne opreme:

- moderni obdelovalni stroji (struženje, frezanje, mikofrezanje, precizni EDM, Abrasive Flow Machining, antropomorfni robot, itd.),
- precizni merilniki vibracij/pospeškov in sil (dinamometri),
- moderna visokohitrostna termo kamera/pirometri/termoelemneti,
- sinhronizirana merilna oprema Dewesoft (zajem signalov: napetostni, tokovni, merilni lističi, dinamometri, pospeškometri, termočleni, kamera za strojni vid, itd.),
- merilniki/analizatorji čistosti površin,
- merilniki kakovosti zraka v delovnih prostorih (trdi delci, itd.),
- Beckhoff PLC računalnik za povezavo s krmilniki obdelovalnih strojev,
- itd.

Na podlagi teh smernic in individualnih želj/zanimanj kandidata, bo v začetni fazi kandidatu določena tema/smer raziskovanja, ustrezni podiplomski izpiti, seminarji in komisije za zagovore le teh. Mlad raziskovalec bo uvrščeni v 34 plačilni razred. Poleg tega ima plačano šolnino na doktorskem študiju. Glede na dogovor pa so mogoče tudi nagrade za delovno uspešnost oz. omogočanja gostovanja na tujih mednarodnih raziskovalnih inštitucijah.

eng:

The young researcher will be included in the research group of the Department for Management of Machining Technologies (Cutting Laboratory and Quality Assurance Laboratory). In addition to his/her studies, the young researcher will participate in industrial, national and European research projects, which are co-ordinated by the research group. There will be the possibility of active collaboration/exchange with other international universities (Sweden, France, Spain, Austria, Germany, USA) with which the research group is working closely.

Sustainable development, digitalization and artificial intelligence are emerging as key research areas, as the future competitive advantage of Slovenian manufacturing companies in the green transition and digitalization will depend on the development of high-performance machining/manufacturing technologies and their practical application. The research content and objectives of the group are thus focused on the adoption, transfer and research support of high-performance machining technologies, including: innovations of high-productivity manufacturing processes, introduction of artificial intelligence tools to achieve smart processes, development of high-precision micro-machining processes, achievement of modern clean machining methods, application of "big data" technologies, etc., for which a large share of the research group's activities is devoted. The Young Researcher Program will thus focus on three potential areas:

- Development of an innovative methodology for characterizing machinability using modern sensors (Kistler, Dewesoft).
- Capturing "Big Data" and using Artificial Intelligence to characterize machining processes/machines/products.
- LCA of machining processes (cleanliness of processes, workspace, water-based super lubricants, etc.).

The fields are broad and suitable for students who have completed a master's degree in

mechanical engineering, electrical engineering, chemistry, etc.

The laboratory has a wide range of modern research equipment that is available for activities of candidates:

- modern machine tools (turning, milling, micro-milling, precision EDM, Abrasive Flow Machining, anthropomorphic robot, etc.),
- precision vibration/acceleration and force sensors (dynamometers),
- modern high-speed thermal camera/pyrometers/thermoelectrodes,
- Dewesoft synchronized measuring equipment (signal acquisition: voltage, current, measuring slips, dynamometers, accelerometers, thermocouples, machine vision camera, etc.),
- surface cleanliness sensors/analyzers,
- workplace air quality monitors (particulate matter, etc.),
- Beckhoff PLC computer for connection to machine controllers,
- etc.

Based on these guidelines and the candidate's individual wishes/concerns, the candidate will be initially assigned a topic/direction of research, the relevant postgraduate examinations, seminars and their defense committees. The young researcher will be placed in 34 Slovenian public salary grade. In addition, he/she will have his/her PhD tuition fees paid. Depending on the agreement, there may also be merit awards or opportunities to be hosted by international research institutions abroad.