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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

prof. dr. Gregor Čepon gregor.cepon@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.05 Mehanika

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 se bo izobraževal na področju dinamike sistema prožnih in togih teles za namen razvoja kinematskega in dinamskega model industrijskega robota. V sklopu raziskovanja se bo osredotočil na karakterizacijo dinamskih lastnosti harmoničnih pogonskih sklopov, ki poleg pogonske funkcije zagotavljajo tudi spoje med posameznimi stopnjami robota. Pri karakterizaciji spoja bo raziskal možnost integracije naprednih metod dinamskega podstrukturiranja za karakterizacijo eksperimentalnega odzivnega modela modela spoja, ki bodo upoštevale polno interakcijo med posameznimi prostostnimi stopnjami spoja.

Potrebna dodatna znanja/usposobljenost

- Znanje programiranja v ekosistemu Python
- Znanje na področju popisa kinematike in dinamike industrijskih robotov (DH formulacija)
- Tehnične spretnosti pri delu z eksperimentalno opremo in zajemnimi sistemi
- Poznavanje programskega paketa Ansys za modeliranje dinamskega odziva sistemov
- Poznavanje odprtokodnega programskega paketa pyFBS za dinamsko podstrukturiranje

eng: Young researcher will be educated in the field of dynamics of flexible and rigid bodies for the purpose of developing the kinematic and dynamic model of an industrial robot. In the course of the research, he will focus on the characterization of the dynamic properties of harmonic drive assemblies, which, in addition to the driving function, also provide joints between the individual stages of the robot. In characterizing the joint, he will explore the possibility of integrating advanced dynamic substructuring methods to characterize the experimental response model of the joint model, which will take into account the interaction between the individual degrees of freedom of the joint.

Additional knowledge/skills required

- Knowledge of programming in the Python ecosystem
- Knowledge in the field of kinematics and dynamic models of industrial robots (DH formulation)
- Technical skills in working with experimental equipment and acquisition systems
- Knowledge of the Ansys software package for modeling the dynamic response of systems

- Knowledge of the open-source software package pyFBS for dynamics substructuring

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Matija Jezeršek, matija.jezersek@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Laserska tehnika in optodinamika

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: *Delo se nanaša na področje razvoja laserskih sistemov in raziskav interakcije med lasersko svetlobo in snovjo. Poseben poudarek bo na razvoju inovativnih laserskih sistemov za medicinsko uporabo. Delo bo potekalo eksperimentalno in teoretično.* *Od kandidata se pričakuje znanja s področja laserske tehnike, mehatronike, programiranja in obdelave podatkov.*

eng: The work relates to the development of laser systems and research into the interaction between laser light and matter. Particular attention is paid to the development of innovative laser systems for medical applications. The work will be carried out experimentally and theoretically. The candidate is expected to have knowledge in the field of laser technology, mechatronics, programming and data processing.

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*):

Prof. dr. Mitjan Kalin mitjan.kalin@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.11 Konstruiranje

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: Vpliv realne kontaktne površine na trenje Obnašanje realne kontaktne površine predstavlja eno pomembnejših raziskovalnih tematik na področju tribologije. Kljub številnim raziskavam so razlike med teoretičnimi in redkimi eksperimentalnimi ugotovitvami zelo velike, zato veljavnega modela še ni bilo razvitega. Mladi raziskovalec bo v okviru svoje doktorske naloge eksperimentalno obravnaval kontakte inženirskih površin na submikronskem nivoju in vrednotil pojave, ki vplivajo na razvoj in velikost realne kontaktne površine. Uporabil bo lastno razvito preizkuševališče, ki s pomočjo optične metode popisuje razvoj realne površine, preko ustreznih senzorjev pa sočasno še pomik in silo, ki omogočajo spremljanje deformacij stanja na nanometrski skali. Uporabili se bodo različni inženirski materiali in različne hrapavosti. Realno kontaktno površino se bo obravnavalo za statične in gibajoče kontakte. Cilj raziskave je določiti odvisnosti med lastnostmi materiala, obremenitvijo kontaktov in realno kontaktno površino za statične kontakte in kontakte z relativnim gibanjem. V primeru uspešno določene odvisnosti med obremenitvijo, realno površino ter trdoto ali natezno trdnostjo in hrapavostjo, bo to prvi tak rezultat v svetovni literaturi in pomemben doprinos k razumevanju realnih triboloških lastnosti. S tem pa bo mogoče bolj realno določiti povezavo realne kontaktne površine s trenjem, ki se bo eksperiemtnalno določil na samem preizkuševališču.

eng: Effect of the real contact area on friction The behaviour of a real contact area represents one of the most important research topics in the field of tribology. Despite many studies, the differences between theoretical and rare experimental findings are very large, so no valid model has yet been developed. As part of his doctoral thesis, the young researcher will experimentally treat the contacts of engineering surfaces at the submicron level and evaluate the phenomena that affect the development and size of the real contact surface. It will use an in-house developed testing facility that, with the help of an optical method, records the development of the real contact area, and through the corresponding sensors, displacement and force at the same time, which enable the monitoring of asperity deformations on the nanometer scale. Different engineering materials and different roughnesses will be used. The real contact area will be considered for static and sliding contacts.

The aim of the research is to determine the dependencies between material properties, contact load and real contact area for static contacts and contacts with relative motion. In case of successfully determined dependence between load, real contact area and hardness or tensile strength and roughness, this will be the first such result in the open literature and an important contribution to the understanding of true tribological properties. With this, it will be possible to more realistically determine the connection of the real contact area with friction, which will be experimentally determined on the test rig itself.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Jože Kutin, joze.kutin@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Meroslovje (Metrology)

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 se bo usposabljal na področju meroslovja temperature, s poudarkom na merilni dinamiki temperaturnih zaznaval v nekonvencionalnih tekočinah, ki postajajo pomembni delovni in energijski mediji v luči doseganja zavez neto ničelnih emisij (npr. ogljikov dioksid v različnih agregatnih stanjih).

Glavni cilji dela so pridobivanje novih znanj glede temperaturne merilne dinamike v omenjenih pogojih ter razvoj preskusnih/merilnih sistemov in postopkov za določanje odzivnosti temperaturnih zaznaval v laboratorijskih pogojih in na mestu uporabe.

Delo kandidata bo vključevalo teoretične in eksperimentalne raziskave. V okviru teoretičnih raziskav bodo postavljeni matematični modeli temperaturnih zaznaval, ki bodo uporabljeni za spoznavanje fizikalnih vplivnih parametrov na dinamično odzivnost v različnih pogojih toka tekočin. V okviru eksperimentalnih raziskav bo potekal razvoj eksperimentalnih preskuševališč in preskusnih postopkov za določanje odzivnosti temperaturnih zaznaval. Kandidat se bo naučil tehnik digitalne obdelave signalov in vrednotenja merilne negotovosti pri dinamičnih preskušanjih in merjenjih.

Zaželjeno je, da kandidat izkazuje zanimanje za poglobljen študij in samostojno raziskovalno-razvojno delo. Prav tako je zaželjeno aktivno pisno in govorno znanje angleščine.

eng: The young researcher will be trained in the field of temperature metrology, with an emphasis on the measurement dynamics of temperature sensors in unconventional fluids, which are becoming important working and energy media in the light of achieving commitments to net zero emissions (e.g. carbon dioxide in different aggregate states).

The main goals of the work are the acquisition of new knowledge regarding temperature measurement dynamics under the mentioned conditions and the development of test/measurement systems and procedures for determining the responsiveness of temperature sensors in laboratory and in-situ conditions.

The candidate's work will include theoretical and experimental research. As part of the theoretical research, mathematical models of temperature sensors will be set up, which will be used to learn the physical influence parameters on the dynamic response in different fluid flow conditions. As part of the experimental research, the development of experimental test facilities and test procedures for determining the responsiveness of temperature sensors will take place. The candidate will learn techniques for digital signal processing and evaluation of measurement uncertainty in dynamic tests and measurements.

It is desirable that the candidate shows interest in in-depth study and independent research and development work. Active written and spoken English skills are also desirable.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Tine Seljak, tine.seljak@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Strojništvo (*Mechanical engineering)*

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.

Delovno mesto mladega raziskovalca vključuje uporabo in adaptacijo različnih simulacijskih paketov za simuliranje reaktivnih tokov s poudarkom na distribuiranih konceptih zgorevanja, ki uporabljajo različne mehanizme kemijske kinetike. Za doseganje ustreznih rezultatov je ključno poznavanje postopka izdelave računske mreže in razvoj ter morebitne prilagoditve geometrije v CAD programih. Delo se osredotoča na podrobno poznavanje teoretičnega ozadja za popis reaktivnih tokov in na numerične metode za diskretizacijo vodilnih enačb. Pomemben del sestavljanja simulacijskega modela je validacija, ki je opravljena na podlagi primerjave z eksperimentalnimi rezultati. Predvidena je torej tudi izvedba eksperimentalnih poskusov na različnih sistemih zgorevanja ter post-procesiranje in analiza podatkov z različnimi programskimi jeziki (Python, Matlab) ter nato kalibracijo simulacijskih rezultatov. Pri razvoju modelov je poudarek tudi na preučevanju in razvoju mehanizmov kemijske kinetike ter zgorevalnih modelov, kar predstavljata dva ključna sestavna dela končnih rezultatov. Raziskovalno delo vključuje tudi sodelovanje pri pedagoškem procesu, pripravo in objavo znanstvenih člankov ter poročil različnih z vsebino dela in študijem povezanih projektov.

Pogoji:
- *obvladovanje simulacijskih paketov Ansys,*
- *poznavanje jezikov Matlab, Python,*
- *izkušnje z implementacijo mehanizmov kemijske kinetike*
- *opravljeno predhodno izobraževanje na področju zgorevanja in goriv ter energetskih sistemov (dokazuje se z opravljenimi predmeti znotraj študija I. ali II. stopnje ali izvenštudijskimi izobraževanji)*
- *dobro poznavanje razširjenih MS Office orodij (excel, word, powerpoint)*
- *znanje angleškega jezika do nivoja, ki omogoča samostojno pisanje znanstvenih člankov (dokazuje se z zaključnim delom študija v angleškem jeziku ali objavljenimi znanstvenimi deli v angleškem jeziku).*

The job position involves the use and adaptation of various simulation packages for simulation of reactive flows, with a focus on distributed combustion concepts using different chemical kinetics mechanisms. Knowledge of the computational meshing process and the development and possible adaptation of the geometry in CAD programs is essential to achieve adequate results. The work focuses on a detailed understanding of the theoretical background for the description of reactive flows and on numerical methods for the discretization of the governing equations. An important part of the construction of the simulation model is the validation, which is performed on the basis of a comparison with experimental results. Therefore, it is foreseen that the candidate will perform also experimental trials on different combustion systems and will post-process and analyse the acquired data using different programming languages (Python, Matlab) and then perform calibration of the simulation results. Model development also focuses on the study and development of chemical kinetics mechanisms and combustion models, which are two key components of the final results. The research work also includes participation in the teaching process, the preparation and publication of scientific papers and reports of various projects intertwined with the work and study.

Conditions:
- *knowledge on Ansys simulation packages,*
- *knowledge on Matlab, Python,*
- *experience with implementation of chemical kinetics mechanisms,*

- *trained/educated in the area of combustion, fuels and energy systems (can be proved by finished subjects at 1st and 2nd stage studies or external trainings),*
- *expert knowledge on MS Office tools (excel, word, powerpoint),*
- *profficiency in english to the level which allows independent writing of scientific articles (can be proved by II. stage thesis written in english or already published scientific papers in english).*

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Lidija Slemenik Perše, lidija.slemenik.perse@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Tehnika, Mehanika, Polimeri *Engineering sciences and technologies, Mechanics, Polymers*

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*: Določitev optimalnih reoloških lastnosti taline visoko-koncentriranega polimernega kompozita za izdelavo polimernih izdelkov z optimalnimi mehanskimi lastnostmi* Edinstvene lastnosti polimerov, kot so enostavnost predelave in majhna teža, lahko združimo z odličnimi lastnostmi polnil in dodatkov, ki izboljšajo nekatere pomanjkljivosti polimernih izdelkov, kot na primer mehansko trdnost, toplotne lastnosti, toplotno stabilnost, magnetne lastnosti, zaviranje gorenja, dielektrične in barierne lastnosti. Dodatek polnil/aditivov polimerni matrici lahko popolnoma spremeni lastnosti materiala in uvede nove funkcionalnosti (npr. samozacelitvene, magnetne, prevodne lastnosti). Razumevanje povezav med strukturnimi spremembami in funkcionalnimi lastnostmi polimernih izdelkov je ključnega pomena za razvoj večfunkcionalnih materialov, ki lahko zadostijo različnim zahtevam brez spreminjanja njihovih kemijskih lastnosti. Dodajanje polnil/dodatkov lahko med drugim tudi izboljša trajnost in življenjsko dobo materialov in njihovih izdelkov. V okviru raziskovalnega programa P2-0264 raziskujemo odnos med topologijo materiala na molekularni ravni in funkcionalnostjo ter mehanskimi lastnostmi polimernih materialov na makro skali. Posebno pozornost posvečamo vplivu termo-mehanskih robnih pogojev (tehnologije), porazdelitvi velikosti molskih mas, dodajanju mikro in nano delcev na funkcionalnost in trajnost izdelkov. V okviru doktorskega dela bomo raziskovali reološke lastnosti na molekularni ravni in funkcionalnost ter mehanske lastnosti polimernih izdelkov na makro skali. Razumevanje zveze med strukturo (reološkimi lastnostmi taline) in mehanskimi lastnostmi končnega izdelka polimernih ekstrudiranih izdelkov bo odprlo nove možnosti predelave in uporabe polimernih kompozitov z visoko vsebnostjo polnil/aditivov za različne namene. Raziskave predlaganega usposabljanja mladega raziskovalca bodo osredotočene na spreminjanje strukture visoko-koncentriranih polimernih kompozitov z nadzorovanjem robnih pogojev med obdelavo oziroma z dodajanjem nano in/ali mikro polnil v polimerno matriko. Poleg eksperimentalnega dela bo doktorsko delo usmerjeno tudi v razvoj novih teoretičnih konstitutivnih modelov za opis tokovnega vedenja kompozitnih materialov z visoko koncentracijo trdnih delcev, ki bodo upoštevali strižne, temperaturne in časovno odvisne viskoelastične lastnosti ter koncentracijo delcev (kar modeli, ki so trenutno na voljo in v uporabi, ne upoštevajo). Tak model bo omogočil lažjo izbiro posameznih komponent takih materialov, optimizacijo tokovnih lastnosti za bolj efektivno predelavo in izboljšane mehanske lastnosti končnih izdelkov.

Mladi raziskovalec bo svoje raziskave v okviru Laboratorija za eksperimentalno mehaniko opravljal na področju reološke karakterizacije, določevanja mehanskih lastnosti ter ekstrudiranja in mikro-injekcijskega brizganja za pripravo vzorcev. Pri tem se bo posluževal različnih raziskovalnih tehnik in metod. Reološke meritve polimernih talin za proces ekstruzije bodo opravljene na reometru Physica MCR302 (Anton Paar), opremljenim z različnimi senzorskimi sistemi. Rotacijski in oscilacijski testi bodo opravljeni pri različnih temperaturah in strižnih pogojih, ki bodo simulirali pogoje, ki jim je polimerna talina izpostavljena med procesom ekstruzije. Za proces ekstruzije se bosta uporabljala ekstruder Haake PolyLab OS PTW16/40 in Xplore Micro compounder MC 15 HT, ki omogoča spreminjanje temperature, tlaka, navora in hitrosti vrtenja polžev. Za izdelavo vzorcev različnih oblik se bo uporabljala naprava Xplore micro injection moulder IM 12.
Ekstrudiranim končnim izdelkom, ki bodo vsebovali različno količino dodanih polnil različnih velikosti in oblik, bodo določene različne mehanske lastnosti: časovno odvisno vedenje bo določeno s pomočjo testov lezenja in relaksacije na reometru Physica MCR702 (Anton Paar); mehanske lastnosti na nano-skali bodo določene s pomočjo nanoindenterja Agilent G200 z uporabo metod (i) statičnega ali t.i. osnovnega testa in (ii) dinamičnega testa kontinuirnega merjenja trdnosti ("continuous stiffness measurement").
Za uspešno opravljanje zastavljenega programa je potrebno znanje angleškega jezika, zaželene so izkušnje z laboratorijskim delom.

eng: *Determination of optimal rheological properties of highly concentrated polymer melts for the production of polymer products with optimal mechanical properties*

The unique properties of polymers, such as ease of processing and low weight, can be combined with excellent properties of fillers and additives that improve some shortcomings of polymeric products such as mechanical strength, thermal properties, thermal stability, magnetic properties, burning inhibition, dielectric and barrier properties. The addition of fillers/additives to polymer matrix can completely change the properties of the material and can introduce new functionalities (e.g. self-healing, magnetic, conductive properties). Understanding the connection between structural changes and mechanical properties of polymer materials is crucial for the development of multifunctional materials that can meet different requirements without changing their chemical properties. Adding fillers/additives can also improve the durability and lifetime of materials and their products.
Within the research program P2-0264, we investigate the relationship between the topology of the material at the molecular level and the functionality and mechanical properties of polymeric materials on a macro scale. Special attention is dedicated to the influence of thermo-mechanical boundary conditions (processing), the distribution of molar masses, the addition of micro and nano particles to the functionality and durability of products. Within the proposed doctoral thesis, we will investigate the rheological properties at the molecular level and the functionality and mechanical properties of polymer products on a macro scale. Understanding the relationship between the structure (rheological properties of the melt) and the mechanical properties of the extruded polymer products will open up new possibilities for the processing and use of highly filled polymer composites for various purposes.
The research within the Young Researcher's training will focus on changing the structure of highly filled polymer composites by controlling the boundary conditions during processing and by adding nano and/or micro-fillers to the polymer matrix. In addition to the experimental work, the doctoral thesis will also focus on the development of new theoretical constitutive models for the description of flow behavior of highly filled composite materials, which will consider also shear and temperature dependent viscosity and the concentration of particles (models, that are currently available and in use, do not consider these effects). Such a model will enable easier selection of

individual components of such materials, optimization of flow properties for more effective processing and improved mechanical properties of highly filled composite products.

Young researcher will perform his research in the Laboratory for Experimental Mechanics in the field of rheological characterization, determination of mechanical properties and extrusion with micro-injection molding for sample preparation. For the experimental part he/she will use various research techniques and methods. Rheological measurements of highly filled polymer composite melts for the extrusion process will be performed with the rheometer Physica MCR302 (Anton Paar), equipped with various sensor systems. Rotation and oscillation tests will be performed at different temperatures and shear conditions, which will simulate the conditions that the melt is exposed to during the extrusion process. For the extrusion process, the Haake PolyLab OS PTW16/40 extruder and Xplore Micro compounder MC 15 HT will be used with the options of changing temperature, pressure, torque and screw speed. For sample preparation with various shapes the Xplore micro injection moulder IM 12 will be used.

Various mechanical properties will be determined for the extruded products with different amounts of added fillers of different sizes and shapes. Time-dependent behavior will be determined using creep and relaxation tests on the Physica MCR702 (Anton Paar); mechanical properties on the nano scale will be determined using the nanoindenter Agilent G200 using the method (s) of a static or i.e. the basic test, and (ii) a continuous stiffness measurement test.

For the successful completion of the proposed program, the knowledge of English language is required, experience with laboratory work is desirable.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Prof. Dr. Božidar Šarler bozidar.sarler@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Procesno strojništvo – Večfazni sistemi / Process Engineering – Multiphase Systems

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 deloval na področju eksperimentiranja in numeričnih simulacij večfaznih sistemov. Raziskovalna skupina se ukvarja z razvojem sistemov za dostavo vzorcev v sinhrotrone in laserje na proste elektrone in intenzivno sodeluje z velikimi raziskovalnimi centri kot je DESY v Hamburgu (www.desy.de), V zvezi s tem smo odlično opremili laboratorij za mikrofluidne raziskave in razvili lastne računalniške programe za simulacijo tovrstnih sistemov na podlagi inovativnih brezmrežnih metod, ki so bile večkrat nagrajene. Cilj izobraževanja mladega raziskovalca bo razvoj simulacij depozicije kapljevine različnih reologij iz šobe na trak, ki bo imel različne površinske lastnosti. Poleg tega bodo simulacije vključevale tudi rast mikrokristalov v tekočini. Izdelane bodo na lastnih superračunalnških kapacitetah in validirane na podlagi primerjave z lastnimi eksperimentalnimi rezultati. Rezultati raziskav bodo namenjeni razvoju novih sistemov za dostavo bioloških vzorcev. *Mladi raziskovalec mora imeti solidno znanje iz mehanike tekočin, računalniškega modeliranja in programiranja. Ima pa naj tudi veselje do eksperimentalnega dela. Dobrodošli visoko motivirani kandidati.*

Eng: The young researcher will work in the field of experimenting and numerical simulations of multiphase systems. The research group is concerned with developing microfluidic sample delivery systems for synchrotrons and free electron lasers and intensively collaborates with large research centres like DESY in Hamburg (www.desy.de). We have excellently equipped a related laboratory for microfluidic research and developed our own computer codes for the simulation of such systems based on several times awarded innovative meshless methods. The young researcher's education goal is to simulate fluid deposition from a nozzle on a tape, considering different fluid rheology and tape properties. Moreover, the simulations will also involve the growth of the solid crystals in the fluid. The simulation will be performed on our own supercomputer facilities and verified by comparison with our own experimental results. The results of the research are aimed at the development of new delivery systems for biological samples. *The young researcher should possess solid knowledge of fluid mechanics, computational modelling and computer coding. It should also possess the joy of experimental work. Highly motivated candidates are welcome.*

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Marko Šimic (marko.simic@fs.uni-lj.si)

3. Raziskovalno področje (*Research field*):

2.10 Proizvodne tehnologije in sistemi (2.10 Manufacturing technologies and systems)

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:
Področje dela mladega raziskovalca bo vezano na pametne tovarne in omogočitvene tehnologije pametnih tovarn. Še posebej je zanimivo področje inovativni izdelovalni sistemi in procesi (IISP) med katere spadajo inteligentna strega in montaža ter notranja logistika v proizvodnem okolju z uporabo avtonomno vodenih vozil ali avtonomnih mobilnih robotov. Za doseganje večje agilnosti sistemov in možnost prilagoditve proizvodnje za različne izdelke in proizvodne plane je potrebno to podrobneje raziskati.
Eno od pomembnih podpodročij so pametna ročna montažna mesta in učinkovita vključenost mobilnih kolaborantovih robotov, ki naj bi pripomogli k izboljšanju varnosti in ergonomije ročnih delovnih mest in hkrati skrajševali čas izdelave, montaže izdelka. V praksi, predvsem pri skrajševanju časov operacij, se izkaže da temu ni tako, saj elementarne operacije, ki bi jih prevzel kolaborativni robot niso pravilno določene. Drugi problem je omejena hitrost kolaborativnih robotov tudi v procesih kjer človek ni prisoten direktno v delovnem področju robota. Možna rešitev se kaže v uporabi več varnostnih sistemov za sprotno spremljanje vseh aktivnosti človeka in robota. Tretji problem se kaže v kolaborativnih orodjih, prijemalih in drugih pripomočkih kateri lahko znižujejo varnost celotnega kolaborativnega robotskega sistema.
Drugo podpodročje predstavljajo mobilni kolaborativni roboti, ki bi bili sposobni samodejnega vključevanja v proizvodni proces glede na proizvodni plan in trenutno potrebo v proizvodnji. Za potrebe logistike, strege in montaže je potrebno zagotoviti sprotno spremljanje proizvodnih aktivnosti, planirati polnjenje mobilnih enot, se izogibati oviram na poti in natančno pozicionirati mobilnega robota na predvidenem proizvodnem mestu, da se lahko uspešno izvedejo operacije strege in montaže. Raziskave bodo temeljile na več metodah: teoretične, numerične (modeliranje in simulacija) in eksperimentalne.

Mladi raziskovalec bo vključen v raziskovalno programsko skupino »Inovativni izdelovalni sistemi in procesi«, ki se lahko pohvali z objavami v uglednih mednarodnih znanstvenih revijah z visokim faktorjem vpliva kot so *Journal of Manufacturing Systems, Energy Conversion and Management, Journal of Cleaner Production, Advanced engineering informatics.* Prek vpetosti v raziskovalno skupino in zaposlitve na Fakulteti za strojništvo bo imel/imela dostop do številnih pomembnih podatkovnih zbirk s področja strojništva, računalništva in informatike, trajnostne strategije, zelenega prehoda. S pomočjo mentorja bo vključen tudi v različne oblike mednarodnega raziskovalnega sodelovanja, vključno z znanstveno-raziskovalnimi konferencami, seminarji, sodelovanjem na industrijskih in mednarodnih projektih.

Mladi raziskovalec bo v času usposabljanja vpisan na redni doktorski študij Fakultete za strojništvo Univerze v Ljubljani s polno zagotovljenim financiranjem. V okviru študija bo pridobil in nadgradil ustrezna teoretična in metodološka znanja za uspešno samostojno raziskovalno delo. V sodelovanju z mentorjem bo v prvem letu doktorskega študija na podlagi okvirne usmeritve v širše področje pametnih tovarn in inteligentnih strežnih, montažnih in logističnih sistemov in procesov poiskal vrzeli v znanstveni literaturi, izoblikoval konkretna raziskovalna vprašanja in metodološki pristop ter prijavil temo doktorske disertacije. V času doktorskega študija bo pod vodstvom mentorja pripravil vsaj dva kvalitetna znanstveno-raziskovalna članka na podlagi doktorske disertacije z jasno izraženim znanstvenim prispevkom oziroma drugih naprednih kvantitativnih metod in ciljem objave v visoko rangiranih mednarodnih znanstveno-raziskovalnih revijah. Mladi raziskovalec mora pravočasno (do zaključka obdobja financiranja) zaključiti doktorski študij z uspešnim zagovorom doktorske disertacije.

Od kandidata oziroma kandidatke za mladega raziskovalca se pričakuje:

- Visoka motiviranost za znanstveno-raziskovalno delo.
- Proaktivnost, ustvarjalnost in vztrajnost.
- Samostojno kritično analitično razmišljanje.
- Odlično pisno in ustno izražanje v angleškem jeziku (še posebej strokovno izražanje na svojem raziskovalnem področju).
- Sposobnost dela s podatki in uporabe kvantitativnih/eksperimentalnih metod.
- Odprtost v komunikaciji in sposobnost tako samostojnega kot skupinskega dela.

Poleg z razpisom zahtevanih obveznih dokazil, ki jih priložijo ob formalni prijavi, je zaželeno, da kandidati oziroma kandidatke mentorju po elektronski pošti (na naslov: marko.simic@fs.uni-lj.si) pošljejo še naslednje dodatne priloge:

- Motivacijsko pismo v angleškem jeziku, zakaj se želijo vpisati na doktorski študij in zaposliti kot mladi raziskovalec (do 2 strani).
- Življenjepis s poudarkom na predhodnem raziskovalnem delu (če obstaja).
- Pregled opravljenih izpitov z ocenami na dodiplomskem in podiplomskem študiju.
- Dokazila o znanju angleškega jezika (certifikat ali ocena pri izpitih iz angleškega jezika).
- Seznam strokovnih in/ali znanstvenih objav (če obstajajo; 1 objava se lahko tudi priloži).
- Potrdila o nagradah in priznanjih (če obstajajo).
- Priporočilna pisma (če obstajajo).

eng:

The field of work of the young researcher will be related to smart factories and enabling technologies of smart factories. Particularly interesting is the area of Innovative Manufacturing Systems and Processes (IMSP), which includes intelligent handling and assembly, as well as internal logistics in the production environment using autonomous guided vehicles (AGV) or autonomous mobile robots (AMR). Further investigation into this is necessary to achieve greater agility of systems and the ability to adapt production for different products and production plans.

One important subfield is smart manual assembly workstations and the efficient integration of mobile collaborative robots, which are intended to improve the safety and ergonomics of manual workstations while simultaneously reducing the time required for product assembly. However, practical implementation, especially in shortening operation times, reveals challenges, as the elementary operations that collaborative robots would take over are not correctly defined. Another issue is the limited speed of collaborative robots, even in processes where humans are not directly present in the robot's workspace. A possible solution lies in the use of multiple safety systems to monitor the activities of both humans and robots in real-time. The third problem arises with collaborative tools, grippers, and other accessories that may compromise the safety of the entire collaborative robotic system.

Another subfield comprises mobile collaborative robots capable of autonomously integrating into the production process based on production plans and current needs. For logistics, assembly, and manufacturing purposes, real-time monitoring of production activities, planning the charging of mobile units, avoiding obstacles, and accurately positioning the mobile robot at the designated production site are necessary for successful assembly and manufacturing operations. Research will be based on various methods: theoretical, numerical (modelling and simulation), and experimental.

The young researcher will be part of the research program group "Innovative Manufacturing Systems and Processes," which boasts publications in prestigious international scientific journals with high impact factors such as the Journal of Manufacturing Systems, Energy Conversion and Management, Journal of Cleaner Production, and Advanced Engineering Informatics. Through involvement in the research group and employment at the Faculty of Mechanical Engineering, they will have access to numerous important databases in the fields of mechanical engineering, computer science, sustainability strategies, and green transition. With the mentor's assistance, they will also engage in various forms of international research collaboration, including scientific conferences, seminars, and participation in industrial and international projects.

During the training period, the young researcher will be enrolled in the regular doctoral program at the Faculty of Mechanical Engineering, University of Ljubljana, with full funding provided. Within the framework of the study, they will acquire and enhance appropriate theoretical and methodological knowledge for successful independent research work. In collaboration with the mentor, in the first year of the doctoral program, based on the general direction into the broader field of smart factories and intelligent servers, assembly, and logistic systems and processes, they will identify gaps in the scientific literature, formulate specific research questions and methodological approaches, and submit a doctoral dissertation topic. During the doctoral studies, under the mentor's guidance, they will prepare at least two high-quality scientific research papers based on the doctoral dissertation, with a clearly expressed scientific contribution or other advanced quantitative methods and the aim of publication in high-ranking international scientific research journals. The young researcher must complete the doctoral studies in a timely manner (by the end of the funding period) with a successful defence of the doctoral dissertation.

Candidates for the young researcher position are expected to:

- Be highly motivated for scientific research work.
- Demonstrate proactivity, creativity, and persistence.
- Possess independent critical analytical thinking.
- Have excellent written and oral expression in English (especially professional expression in their research field).
- Demonstrate the ability to work with data and use quantitative/experimental methods.

Display openness in communication and the ability to work both independently and in groups.
In addition to the mandatory documents required by the call, candidates are encouraged to send the following additional attachments to the mentor via email (to: marko.simic@fs.uni-lj.si):

- A motivation letter in English, explaining why they wish to enrol in the doctoral program and work as a young researcher (up to 2 pages).
- A curriculum vitae emphasizing previous research work (if any).
- A list of completed exams with grades in undergraduate and graduate studies.
- Proof of English language proficiency (certificate or exam grade in English language).
- A list of professional and/or scientific publications (if any; one publication can also be attached).
- Certificates of awards and recognitions (if any).
- Letters of recommendation (if any).

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Roman Šturm roman.sturm@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.10 - proizvodne tehnologije in sistemi

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:
Mehansko obnašanje in s tem zanesljivost/trajnost inženirskih komponent, izdelanih z lasersko aditivno tehnologijo (LBAM), še vedno ni dobro razumljeno. Dobo trajanja takih dinamično obremenjenih izdelkov je možno povečati z visokoenergijskim utrjevanjem površine, kot je to lasersko udarno utrjevanje ali nadzvočno udarno utrjevanje. Udarno utrjevanje površine vnese tlačne zaostale napetosti, vendar pa obdelovalni pogoji bistveno vplivajo na velikost in potek le teh v globino. Zato je pomembno znati določiti lastnosti tako izdelanih delov (mehanske in mikrostrukturne), da lahko napovemo njihovo delovanje med uporabo. Poiskali se bodo taki procesni parametri obdelave površine, ki bodo prinesli ugodno kombinacijo gostote dislokacij in mikrostrukturnih značilnosti z LBAM narejene zlitine za izboljšanje mehanskih lastnosti zlitine. Gostota dislokacij se bo merila posredno preko uporabe povšinskih Rayleighovih valov, s čimer se bo karakterizirala stopnja površinske plastične deformacije ter posledično spremembe mikrostrukture modificiranega materiala.

Predviden program usposabljanja vključuje sledeče pomembne sestavine:
Pregled obstoječe literature: klasifikacija in lastnosti prahov namenjenih za razne postopke LBAM, vplivi dodajnih legirnih elementov na mehanske lastnosti zlitine, vpliv mehanske in toplotnih obdelav na lastnosti zlitin, obrabni in poškodbeni mehanizmi...
Optimiranje LBAM: razvoj metode za napovedovanje mehanskih lastnosti izdelka.
Optimiranje gostote dislokacij s postopkom brezkontaktnega udarnega utrjevanja površine: izvedba različnih preizkusov za določevanje najboljših obdelovalnih parametrov.
Pridobivanje materialnih lastnosti, verifikacija razvite metodologije: izvedba LBAM, izvedba testov toplotne obdelave, izvedba testov udarnega utrjevanja, pridobivanje mehanskih lastnosti v odvisnosti od toplotne obdelave in udarnega utrjevanja, uporaba povšinskih Rayleighovih valov za karakterizacijo stopnje površinske plastične deformacije. Implementacija nove metode karakterizacije površine v proces razvoja izdelka.

Zaželeno znanje slovenskega jezika.

eng:
The mechanical behavior and thus the reliability/durability of engineering components manufactured by laser-based additive manufacturing (LBAM) is still not well understood. The service life of such dynamically loaded products can be increased by high-energy surface hardening, such as laser shot peening or supersonic peening. Shot peening of the surface introduces compressive residual stresses, however, the processing conditions significantly affect the size and gradient in depth.
Therefore, it is important to be able to determine the properties of such manufactured parts (mechanical and microstructural) to be able to predict their performance during use. Such surface treatment process parameters will be sought which will bring a favorable combination of dislocation density and microstructural characteristics of the alloy made by LBAM to improve the mechanical properties of the alloy. The density of dislocations will be

measured indirectly with the use of surface Rayleigh waves, which will characterize the degree of surface plastic deformation and, consequently, changes in the microstructure of the modified material.

The envisaged training program includes the following important components:
Review of existing literature: classification and properties of powders intended for various LBAM processes, effects of additional alloying elements on the mechanical properties of the alloy, effect of mechanical and heat treatments on the properties of the alloys, wear, and damage mechanisms...
Optimizing LBAM: developing a method for predicting product mechanical properties.
Optimizing dislocation density using a non-contact impact hardening process: performing various tests to determine the best machining parameters.
Acquisition of material properties, verification of the developed methodology: execution of LBAM, execution of heat treatment tests, execution of non-contact impact hardening tests, acquisition of mechanical properties depending on heat treatment and non-contact impact hardening, use of surface Rayleigh waves to characterize the degree of surface plastic deformation. Implementation of a new surface characterization method in the product development process.

Knowledge of the Slovenian language is desirable.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo

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

Jaka Tušek jaka.tusek@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Strojništvo (Mehanika / Procesno strojništvo)

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:
Hlajenje dandanes predstavlja približno 25% vse porabljene energije, pri tem pa potrebe po hlajenju na globalni ravni naraščajo eksponentno. Praktično vsi hladilni sistemi, klimatske naprave, kot tudi toplotne črpalke temeljijo na okoljsko sporni parno-kompresijski tehnologiji. V zadnjih letih mehanokalorični učinki v trdninah kažejo velik potencial kot okolju prijazna alternativa parno-kompresijski tehnologiji hlajenja in toplotnih črpalk. Med mehanokalorične učinke sodita elastokalorični in barokalorični učinek. Prvi je bolj raziskan in že uporabljen v številnih elastokaloričnih prototipnih napravah, medtem ko je barokalorični učinek in s tem povezana tehnologija šele v začetni fazi razvoja. Mehanokalorični učinek temelji na povračljivih temperaturnih in/ali entropijskih spremembah, ki so posledica trdninske fazne transformacije med zaradi spremembe tlačnega ali napetostnega stanja materiala.

Mladi raziskovalec se bo pridružil interdisciplinarni skupini na Fakulteti za strojništvo in bo sodeloval pri razvoju novih mehanokaloričnih konceptov in naprav. Njegovo delo bo zajemalo mehansko in toplotno karakterizacijo najbolj obetavnih mehanokaloričnih materialov; razvoj novih fenomenoloških modelov za popis njihovega mehanskega odziva ter mehanokaloričnih lastnosti; in razvoj ter eksperimentalna verifikacija numeričnega modela namenjenega simuliranju in parametrični analizi delovanja mehanokalorične naprave.

Od kandidate(ke) se pričakuje znanje termodinamike in mehanike kontinuov ter osnove programiranja (Python/Matlab, LabView). Zaželeno je tudi predznanje na področju kaloričnih učinkov v trdninah.

eng:
Cooling and refrigeration and air-conditioning nowadays account for around 25% of total energy consumption, and the cooling demands are increasing exponentially in the recent years. Practically all refrigerators, air-conditioning devices as well as the heat-pumps are based on the environmentally harmful vapor-compression technology. In recent years, mechanocaloric effects in solids have shown a great potential as an environmentally friendly alternative to vapor-compression technology. Mechanocaloric effects include the elastocaloric and barocaloric effects. The former is more widely researched and already applied in several elastocaloric prototype devices around the globe, while the barocaloric effect and the related technology is still in its early stages of development. The mechanocaloric effect is based on reversible temperature and/or entropy changes related to a solid-state phase transition due to a change in the pressure or stress state of the material.

The young researcher will join interdisciplinary team at the faculty of mechanical Engineering and will be involved in the development of novel mechanocaloric concepts and devices. His/Her work will include the mechanical and thermal characterization of the most promising mehanocaloric materials; the development of new phenomenological models to characterize their mechanical response and mehanocaloric properties; and the development and experimental verification of a numerical model to simulate and parametrically analyze the performance of a mechanocaloric device.

The candidate is expected to have knowledge of thermodynamics and continuum mechanics as well as basic programming skills (Python/Matlab, LabView). Prior knowledge in the field of caloric effects in solids is also desirable.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Nikola Vukašinović, nikola.vukasinovic@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

Računalniško podprto konstruiranje

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/a raziskovalec/ka, bo po potrditvi vključen/a v raziskovalno skupino Katedre za konstruiranje in transportne sisteme (Laboratorij za konstruiranje LECAD). Poleg študijskih obveznosti, bo sodeloval/a na industrijskih, domačih, ter evropskih raziskovalnih in razvojnih projektih, v katerih sodeluje oz. jih koordinira ekipa v laboratoriju LECAD. Tu bo možnost aktivnega sodelovanja z drugimi mednarodnimi univerzami (Švedska, Italija, Avstrija, Hrvaška, Nemčija, ZDA, itd), s katerimi laboratorij sodeluje. Laboratorij LECAD je s svojimi referencami in aktivnim delovanjem vključen med drugim tudi v programsko skupino »Decentralizirane rešitve za digitalizacijo industrije ter pametnih mest in skupnosti« v sodelovanju s Fakulteto za elektrotehniko UL. Izbrani/a kandidat/ka se bo v sklopu nalog osredotočal/a predvsem na iskanje rešitev za digitalizacijo industrije v smeri decentraliziranega upravljanja življenjskega cikla izdelkov, industrijskih in proizvodnih sistemov in virtualizacije kot dela decentraliziranih industrijskih aplikacij v sklopu omenjene programske skupine. Pri tem bo raziskal/a in upošteval/a širša področja trajnostnega razvoja, digitalizacije in orodij umetne inteligence v inženirskih in industrijskih procesih. V drugem koraku raziskave bo kandidat/ka identificiral/a fokusno področje na katerem bo gradil/a svojo doktorsko raziskavo. Predvidoma bo to uporaba algoritmov umetne inteligence in upravljanja podatkov pri razvoju novih, optimiziranih tehničnih rešitev in proizvodov. Za uspešno doseganje zastavljenih raziskovalnih ciljev se od kandidata/tke pričakuje: • dobro poznavanje ozadja delovanja CAD orodij • dobro znanje iz programiranja (Python, C#, C++) za izdelavo novih CAD in AI podprtih orodij • osnove poznavanja AI in ML orodij.

eng: Upon confirmation, the young researcher will be included in the research group of the Chair of engineering design and transportation systems (LECAD Engineering Design Laboratory). In addition to his/her studies, the young researcher will participate in industrial, national and European research and development projects involving or coordinated by the team in the LECAD laboratory. There will be the possibility to actively collaborate with other international universities (Sweden, Italy, Austria, Croatia, Germany, USA, etc.) with which the laboratory cooperates. The LECAD laboratory, with its credentials and active work, is also involved, among others, in the programme group "Decentralised solutions for the digitalisation of industry and smart cities and communities" in cooperation with the Faculty of Electrical Engineering of UL. The selected candidate will focus mainly on finding solutions for the digitalisation of industry towards decentralised lifecycle management of products, industrial and production systems and virtualisation as part of decentralised industrial applications within the framework of the above-mentioned programme group within the scope of his/her assignments within the LECAD laboratory. In doing so, it will explore and consider the broader areas of sustainable development, digitisation and artificial intelligence tools in engineering and industrial processes. In the second step of the research, the candidate will identify a focus area on which to build his/her PhD research. This is expected to be the application of AI and data management algorithms in the development of new, optimised technical solutions and products. In order to successfully achieve the research objectives, the candidate is expected to: - good background knowledge of CAD tools - good programming skills (Python, C#, C++) for the development of new CAD and AI-based tools - basic knowledge of AI and ML tools.

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

1. Članica UL (*UL member)*:

Fakulteta za strojništvo (Faculty of Mechanical Engineering)

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

Andrej Žerovnik, andrej.zerovnik@fs.uni-lj.si

3. Raziskovalno področje (*Research field*):

2.11.02 Specialna konstrukcijska znanja, 3.08 Javno zdravstvo (varstvo pri delu)

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:
Raziskovalna skupina Laboratorija za modeliranje elementov in konstrukcij je mednarodno vpeta v napredne inovativne raziskave na področju specialnih konstrukcijskih znanj in medicine. Mladi raziskovalec bo član dinamične in multidisciplinarne ekipe, z delom na področju eksperimentalne analiza, numeričnega modeliranja in razvoja inovativnih rešitev na področju specialnih konstrukcijskih znanj ter medicinskih aplikacijah. V stimulativnem okolju bo v sodelovanju s člani raziskovalne skupine Modeliranje v tehniki in medicini aktivno deloval na enem od sledečih področji (področje se določi na podlagi razgovora):

- *Utrujanje večosno obremenjenih materialov z oblikovnim spominom (SMA): Raziskovanje vpliva večosnih obremenitev in njihovih faznih zamikov na strukturno in funkcijsko utrujanje SMA zlitin, ki se uporabljajo v različnih inženirskih aplikacijah kot so elastokalorična tehnologija, aktuatorji, vzmeti itd.*
- *Več-nivojsko modeliranje kompozitnih materialov z oblikovnim spominom: Eksperimentalno opazovanje ter razvoj in validacija numeričnih modelov za napovedovanje mehanskih lastnosti in odzivov kompozitnih materialov pri različnih obratovalnih pogojih.*
- *3D tiskani kompozitni materiali kot medicinski implantati: Raziskave na področju razvoja, izdelave in uporabe naprednih kompozitnih materialov za razvoj in izboljšanje medicinskih implantatov z namenom prilagojene izdelave ter izboljšanja bio-kompatibilnosti in funkcionalnosti.*

Zaželeno je:

- *Predhodno znanje in veščine kandidatov s področja strojništva, fizike in materialov (najmanj enega področja).*
- *Znanje angleškega jezika, tako pisno kot ustno, za komunikacijo z mednarodnimi raziskovalnimi skupinami in objavo znanstvenih prispevkov.*
- *Močna motivacija za raziskovalno delo in želja po doseganju odličnosti.*
- *Samostojnost, dobre organizacijske sposobnosti in sposobnost dela v ekipi.*
- *Pripravljenost na sodelovanje z mednarodnimi partnerji in udeležbo na mednarodnih znanstvenih konferencah.*

eng:
The research group from the Laboratory for the Modelling of Elements and Structures is internationally engaged in advanced innovative research in the field of specialized construction knowledge and medicine. The young researcher will be a member of a dynamic and multidisciplinary team, working in the areas of experimental analysis, numerical modelling, and the development of innovative solutions in the field of specialized construction knowledge and medical applications. In a stimulating environment, in collaboration with members of the research group of Modelling in Engineering and Medicine, they will actively work in one of the following areas (the area is determined based on an interview):

- *Fatigue of multi-axially loaded shape memory alloys (SMA): Investigating the influence of multi-axial loads and their phase shifts on the structural and functional fatigue of SMA alloys used in various engineering applications such as elastocaloric technology, actuators, springs, etc.*

- *Multi-scale modelling of shape memory composite materials: Experimental observation and the development and validation of numerical models for predicting the mechanical properties and responses of composite materials under different operating conditions.*
- *3D printed composite materials as medical implants: Research in the development, manufacturing, and use of advanced composite materials for the development and improvement of medical implants aimed at customized fabrication and enhancing bio-compatibility and functionality.*

Expected candidate skills:

- *Prior knowledge and skills in the fields of mechanical engineering, physics, and materials (at least one of fields).*
- *Proficiency in English, both written and spoken, for communication with international research groups and the publication of scientific contributions.*
- *Strong motivation for research work and a desire to achieve excellence.*
- *Independence, good organizational skills, and the ability to work in a team.*
- *Willingness to collaborate with international partners and participate in international scientific conferences.*