Subject: Production cell upgrade in scope of the HIA project

Invitation to tender

Production cell upgrade in scope of the HIA project

Celje, October 2020

Invitation to tender

1. General information

The HIA Project is funded by the European Union (hereinafter referred to as the "EC") within the Framework Programme for Research and Innovation - Horizon 2020, on the basis of the Grant Agreement 2018CE160AT115 concluded between TECOS, Ministry of Economic Development and Technology and the European Commission (hereinafter referred to as the "Grant Agreement").

Ministry of Economic Development and Technology is the grant coordinator and TECOS has been delegated the implementation the project entitled "Slovenian Pilot for an Industry 4.0 Transformative Mechanism" and also has the role of distributor of vouchers in the cascade funding scheme.

The grant approved for funding of the HIA SME-driven Industry 4.0 projects is 250.000 €, from which 5 vouchers will be distributed to SMEs (1 voucher max./company, max. 5/consortium). That means 50.000 € max per voucher.

Each voucher receiving SME is obligated to privately co-fund their project in the amount of minimum 50 % of the overall project costs (each voucher is to be co-funded by the SME for at least the same amount of investment). The allowed co-funding is in the form of in-kind contribution and operational expenditures such as: direct personnel costs, limited equipment-related costs (i.e. the contribution should not only be about purchasing equipment. These costs are at the discretion of TECOS and to be approved by the HIA International Expert Group), depreciation, materials and other direct costs (such as travel costs).

Eligible costs

Type of eligible cost by purpose	Eligible costs
Wage costs and reimbursement of work - related costs	- Salary and allowances with all related taxes except VAT and contributions of the employee and the employer - in full or in part of the work on the operation, for persons who have concluded an employment contract with the beneficiary - Reimbursement of work-related expenses - in full or in part of the work on the operation, for persons who have concluded an employment contract with the beneficiary - Reimbursements and benefits (eg sick leave for up to 30 days) if the employer does not reimburse labor costs from other sources - Other remuneration in accordance with the applicable legislation (holiday pay, severance pay in accordance with Article 79 of ZDR-1, etc., in the case of partial work on the operation in a proportionate share) - Jubilee awards in accordance with the applicable legislation (if legally obligatory for the employer, in the case of partial work on the operation in a proportional share) - Collective supplementary pension insurance premiums (if legally required by the employer)
Equipment-related costs	- Costs of purchasing new tangible and unspecified fixed assets, if, in this way, it is directly linked to the production cell upgrade in scope of the provisions stated, they will only be used for dedicated operations throughout their lifetime (at the discretion

	of TECOS and to be approved by the HIA International Expert Group). - Depreciation costs of equipment or other assets (new or second-hand) as recorded in the tenderers accounting statements - Costs of renting or leasing equipment or other assets, provided that these costs do not exceed the depreciation costs of simmilar equipment or assets and are exclusive of any financial fee
Outsourcing costs	- Costs arising from the contract for services for external staff (salary of experts, without other costs) - Staff training costs (registration fees) - Administrative and technical services (eg use of external accounting services)
Business travel expenses	- Staff travel costs related to activities in the project
Indirect costs	- Overheads (company management, secretariat, security, legal and economic service, common space rents, maintenance and insurance costs, in proportion to the eligible activities compared to all company activities. Eligible costs are calculated according to a reasonable and logical key)

TECOS in this regard invites interested companies to tender by submitting a written proposal in accordance with this invitation to tender.

2. Contact

Contact persons: Simona Kneževič Vernon (simona.vernon@tecos.si) and Matic Eržen (matic.erzen@ijs.si)

3. Tender and instructions to tender

The tenderer has to submit their tender before the defined deadline to simona.vernon@tecos.si.

The tender has to be submitted to the above e-mail by the deadline, defined in the call. The tenders submitted after the deadline, will be late and considered ineligible.

In order to avoid issues, save your confirmation of submission with the correct date and time listed. Please send the tender in the numerical order listed in the call.

Instructions are meant to provide help in preparing your tender. Please make sure that your tender is written in accordance with the instructions in this document. Please attach all the requested information in the requested manner and order.

The tender is constructed by the applicant by writing the requested information in the brackets of the template attached to the call.

The tender must be made on the basis of forms from the annexes to the call or according to the content and form of the same forms prepared by the applicant. Applicants must submit declarations without

additional conditions. All documents must be completed, signed and stamped by the applicant (legal representative or authorized person with attached authorization)

The tender shall be submitted electronically, so the signature and stamp scans are valid.

It is desirable:
- that all documents in the places where it is marked are signed by an authorized person and stamped with the stamp of the applicant;
- that all pages in the tender are numbered, and the applicant states in the accompanying cover letter the total number of pages in the tender;
- that the provider affixes any corrections with the stamp and signature of his authorized person.

The tender shall not contain any changes and additions that are not in accordance with the invitation. Corrected errors must be marked with the initials of the person signing the tender.

The invitation to tender is written in English. The tenders also have to be written and submitted in English.

The tender may be submitted in another language in the part relating to technical characteristics, quality and technical documentation, such as prospectuses, propaganda and technical material, etc.

Certificates from foreign authorities shall be submitted in the original, which is accompanied by an English version.

The tenderer shall bear all costs related to the preparation and submission of the tender. In the event that TECOS does not complete the procedure by selecting the winning tenders or does not conclude a contract with the most favourable tenders, TECOS shall not be liable to the tenderer for the costs related to the preparation of the tender. TECOS's liability under Article 20 of the Code of Obligations is also excluded in the event that TECOS fails to conclude the procedure by selecting the most favourable tenders or fails to conclude a contract with the selected tenderer for non-fulfillment of the conditions for awarding or realizing the subject of the open call.

4. Submission deadline

The tender submission deadline is 8th of January 2021.

5. Tender review

Tender reviews are not public.

6. Tender validity

Validity deadline: **at least 30 days after the submission deadline**

The tender must be valid at least until the specified deadline. Shorter tender validity means a reason to reject the tender.

7. Laws and regulations

The contract is carried out mainly in accordance with the provisions of the following laws and the implementing regulations adopted on the basis thereof:
- Grant Agreement nr. 2018CE160AT115 and all the attached annexes;
- Public Finance Act (ZJF; Uradni list RS, No. 11/11 - officially consolidated text, 14/13 - amended, 101/13, 55/15 - ZFisP, 96/15 - ZIPRS1617 and 13/18);

- Integrity and Prevention of Corruption Act (ZIntPK; Official Gazette of the Republic of Slovenia, No. 69/11 - official consolidated text);
- Code of Obligations (OZ; Official Gazette of the Republic of Slovenia, No. 97/07 - official consolidated text, 64/16 - US decisions and 20/18 - OROZ631) and
- all other applicable legislation in force in the Republic of Slovenia and regulating the relevant field;

For the duration of the invitation, TECOS and the tenderer may not initiate and carry out actions that would predetermine the selection of a particular tender. During the selection of the tender until the entry into force of the contract, TECOS and the tenderer may not initiate actions that could lead to the contract not entering into force or not being fulfilled.

In the event of termination of the procedure, neither party may initiate and carry out procedures that would make it difficult to annul or change the decision on the selection of the contractor or would affect the impartiality of the International expert group appointed by the contracting authority.

8. Termination of the procedure, rejection of all tenders, withdrawal from the execution of the invitation

TECOS reserves the right to suspend the procedure and withdraw from the execution of the contract if the contract with the tenderer on executing and co-financing the operation, which is in progress, is not signed.

9. Supplementing, amending and clarifying tenders

If the information or documentation to be provided by tenderers is or appears to be incomplete or incorrect, or if individual documents are missing, TECOS may require tenderers to submit missing documents within a reasonable time or to supplement, correct or clarify the relevant information or documentation provided that such a requirement is fully in line with the principles of equal treatment and transparency.

10. Conclusion of the contract and amendment of the contract

The selected tenderers will be invited to sign the contract.
The Grant Agreement nr. 2018CE160AT115 which, as mentioned in the call documentation, presents the legal basis for the action is not public and will therefore be sent to the winning tenderers along with the invitation to sign the contract.
If the selected tenderer does not respond by returning the signed version of the contract within eight (8) working days after receiving the invitation to sign the contract and sends or delivers it to the address / registered office of TECOS (transmission theory), TECOS may consider that the selected tenderer has withdrawn.
Given the possible limitations due to COVID-19 pandemic, the contract can be digitally signed and sent via e-mail to simona.vernon@tecos.si in case the delivery of the physical version is not possible. In such case, a prior indication of such action and agreement with TECOS via the listed e-mail is necessary.

11. Legal protection

TECOS due to its status Is not legally obliged to implement the procedure based on public procurement. But as HIA project is a project funded by EC budget- public funds, this call is respecting full transparency and legal stipulations.

Project is co-financed by the European Union.

12. Criteria for selection of the most favourable tenders

Winning tenders that pass the eligibility check will be chosen on the basis of number of points scored under evaluation criteria defined in the call and where the evaluation will be performed by the HIA established International Expert Group of Industry 4.0 experts.

5 of the highest scoring applicants will be announced as the call winners.

13. Payment processing:

Winning tenderers will be reimbursed after TECOS receives funds from EC and performs an eligibility check, based on a claim accompanied by:

- Contractual documents with service providers, with proof of payment based on authentic accounting documents and other documentation
- Proof of purchase of equipment or other costs, with proof of payment based on authentic accounting documents and other documentation
- Content report, describing on maximum 10 pages progress and activities implemented.

14. Conditions for recognition of competence

An admissible tender is a tender submitted by a tenderer for whom there are no grounds for exclusion and who meets the conditions for participation, his/her tender meets the needs and requirements of TECOS set out in the technical specifications and in the contract documents, has not been proven to engage in illicit collusion or corruption, the contracting authority has not assessed the tender as unusual and the tender does not exceed the TECOS's guaranteed funds.

The applicant must prepare a tender in accordance with the requirements of this invitation. The requirements that the applicant must meet are defined below.

Impunity	TECOS will exclude a tenderer from participation in the HIA project if it finds that the tenderer or a person who is a member of the administrative, management or supervisory body of this economic entity or who has the authority to represent or decide or supervise was involved in a final judgment for an act that has elements of the criminal offenses listed in Article 75 of the ZJN-3. TECOS reserves the right to exclude an applicant from the HIA project at any time during its development if it turns out that before or during the project this entity is in one of the above situations due to the acts committed or not performed.
Proof	Signed applicant's statement

Taxes and contributions paid	TECOS will exclude a tenderer from participation in the project if it finds that the tenderer does not meet mandatory duties and other monetary non-tax obligations in accordance with the law governing the financial administration collected by the tax authority in accordance with the regulations of the country, where the office is registered, if the value of these unpaid expired obligations on the day of submission of the tender is EUR 50 or more. A tenderer shall be deemed not to have fulfilled the obligations referred to in the preceding sentence even if on the day of submission of the tender he did not submit all tax deductions for employment income for the last five years until the date of submission of the tender or application.

TECOS reserves the right to exclude a tenderer from the procedure at any time during the procedure if it turns out that before or during the procedure this entity is in one of the above situations due to the acts committed or not performed. |
| Proof | Signed applicant's statement |

Misdemeanour related to payment for work	TECOS will exclude a tenderer from the procedure if it has been fined in regards to misdemeanour related to payment for work twice in the last three years before the deadline for submission of tenders by a final decision of the competent authority of the Republic of Slovenia or another Member State or third country.

TECOS reserves the right to exclude a tenderer from the procedure at any time during the procedure if it turns out that before or during the procedure this entity is in one of the above situations due to the acts committed or not performed. |
| Proof | Signed applicant's statement |

Ability to pursue a professional activity	Tenderer has to be entered in one of the professional or business registers kept in Slovenia. If tenderers need to have a certain license or be members of a certain organization in order to be able to provide a certain service in their home country, they must provide proof of this license or membership.
Proof	Signed applicant's statement

Technical and professional competence	Tenderer must be professionally qualified to perform the subject of the contract and must meet all the requirements of TECOS specified in the invitation and the requirements set by applicable regulations and legislation in the field of the subject of the contract.
Proof	Signed applicant's statement
Quality	

	The tender has to be constructed under the instructions and requirements listed in the HIA open call documentation. The tenderer, if chosen, is strongly encouraged to upgrade their production cell in a way that ensures interconnectivity with other production cells in the project via common communication protocols and standards.
Proof	Signed Financial plan and Memorandum of understanding by SME and service provider

15. Technical specifications

The applying company has to submit their application in one of the following vertical value chain (VVC) that present the building blocks of Slovenian Smart Specialisation Strategy(S4) in pillar Industry 4.0:

- Intelligent Laser Systems
- Smart Plasma Systems
- Intelligent Control Systems
- Smart Mechatronic Tools
- Robotic Systems and Components

Each application must include Control technologies and at least one other key enable technology (KET), specified in SRIP Factories of the Future and S4:

- Photonics
- Plasma technologies
- Robotics
- ICT Tehnologies

Tenderer can submit only one tender to one selected vertical value chain. Boundary conditions and technical specification for each selected VVC are following:

Intelligent Laser Systems

Tenderer must be an owner (user) or a producer of a digitally controlled laser-based manufacturing cell, designed for highly flexible small-series or prototyping laser manufacturing processes. Control software of the manufacturing cell must be open for the implementation of new flexible, adaptive and self-learning control algorithms.

Project goal will be to develop a concept of a new modular control software architecture, leading to the efficiency gain in the people interaction, lead time, waste production, material use, overall process costs or energy consumption. Furthermore, new control software concept shall enable development of new machine-machine interaction modules as well as integration of the manufacturing cell into a (distributed) factory or advanced research laboratory, including interfaces to different centralized agents (quality control, predictive maintenance, digital twin, ...).

Smart Plasma Systems

The solutions should be focused on upgrading large industrial plasma systems to enable real-time monitoring of processing parameters. Upgrading should enable applicability to any reactor that employs Plasma-Enhanced Chemical Vapour Deposition (PECVD) for deposition of a variety of coatings including, but not limited to deposition of protective coatings, decorative films, metallization

and surface functionalization as a pre-treatment to assure for optimal adhesion of the PECVD coating. Particular requirements are:

- upgrading at least one plasma reactor of volume at least 1 m^3 with detectors or sensors for real-time monitoring of processing parameters;
- data acquisition and storage for automatic traceability.

The control unit should run on Windows platform and should enable remote control. Detectors and sensors should enable long term operability without manual adjustments. Appropriate solutions could employ any technique for plasma characterization including but not limited to optical emission and absorption techniques, titration, calorimetry or electrical probes. The traceability should enable detection of impurity gases of partial pressures at least 5 Pa and response to detection of possible leakage of the plasma reactor over a time period of at most 5 seconds. The solutions should be immune to any stray effects likely to occur upon application of radio-frequency discharges for powering gaseous plasma.

Intelligent Control Systems

All pillar control technologies should be considered for the implementation in the Control platform which should consist of global digital twin for optimization of global logistics and coordination of distributed processes. The digital twin should be connected to 'edge computing' nodes with embedded local digital twins which guide globally distributed production processes like production cells and/or lines via I4.0 ready communication protocols.

All control technologies which enable routing and optimization of process with global digital twin should be connected to local digital twins of processes with their own specific technical specifications:

- *Global digital twins*: should run on Windows platform and is connected to network which should enable communication within platform and with other local digital twins, digital agents and cloud data.
- *Local digital twins*: should be made for every process and should be developed PRO-FORM 360 by using the most frequently used programming languages which support AI implementation and I4.0 ready communication protocols such as python, C++, Java, SimTalk, LISP, Prologo, etc.
- *Digital agents* (AI or smart algorithms): each digital agent should be assigned to its own job or task. It should find a local optimal solution quickly with help of AI or smart algorithms. Further, it should automatically send the solution back to the global digital twin or local digital twin. Digital agents should be developed by using the most frequently used programming languages that support AI implementation and I4.0 ready communication protocols such as python, C++, Java, SimTalk, LISP, Prologo, etc.
- *Edge Computing supported IIoT modules*: industrial I/O, local digital twin with agents and I4.0 ready communication protocols support.
- *AR/VR and other HMI technologies*: technology specific hardware should enable human interaction, access to visual data storage and should be connected to a platform via local data and cloud data.

Smart Mechatronic Tools

Within VVC "Smart Mechatronic Tools" we want primarily to increase the integration of Slovenian toolmakers and prepare them for the challenges of a new industrial revolution - Industry 4.0. The aim of VVC Smart Mechatronic Tools is with active involvement of all stakeholders: toolmakers and tool users to overcome difficulties and find new solutions in all areas where shortcomings are arising. The joint market approach of key players in the value chain in the field of toolmaking, which will integrate both stakeholders in the vertical and horizontal KET chains, will lead to a new product, the

so-called Smart Tools, which will form the core of the digitized production in the companies and will in future largely replace the current conventional tools.

The main objective of integration in the value chain is therefore to change a tool from passive to active connected element with its own artificial intelligence, which is fully integrated into the IT ecosystem of companies (Industrial Internet of Things - IIoT). Such tool (mould or die) will be able at any time to actively monitor the manufacturing process inside the mould, and through the built-in artificial intelligence actively initiate the necessary solutions to in real-time eliminate unforeseen events, thus avoiding delays in production. In addition to pursuing the key objective towards the final product of intelligent mechatronic tools, there will be, in the context of integration into VVC, one of the key strategic objectives also the inclusion of the following critical development axes, which will challenge companies in the tooling chain in the next ten years:

- Advanced automatisation, remote monitoring and production cells
- Simulation methods and tools for consulting services
- Optimisation of smart tools design
- Smart production of tools (3D printing, …)
- Distributed/Integrated Engineering
- Eco-friendly and circular production processes.

Robotic Systems and Components

One of important aspects of Industry 4.0-enabled robotics is high flexibility, minimal zero downtime and maximum efficiency. Given these objectives, it is important to provide fast deployment of new robotic solutions. Therefore, it is necessary to provide implementation of fast, smart and affordable reconfigurable and modular robots as well as peripheral equipment. Robotic systems should proactively monitor and adapt to changes in a production line. By networking, each robot can be able to adapt dynamically not just to its work, but that of other robot and humans within the smart factory.

- Introduction of robot aided reconfiguration concepts to meet new product requirements.
- Knowledge transfer and interoperability between different robotic solutions based on IIoT.
- Introduction of digital twin technology to enhance production efficiency and fast deployment of new tasks and solutions.
- Introduction of smart Plug&Produce elements to enhance workcell flexibility.
- Ability of monitoring and self-improvement of production tasks.
- Development of tools for flexible and safe robot-robot and robot-human cooperation.
- Introduction of intelligent tolls for easy teaching and programming.
- Improvement of quality, productivity, reliability and economic efficiency.

The proposed production challenge should be implemented as a feasibility study in a pilot workcell. It will be based on novel robotic technologies including programming, monitoring and executing operations, preferably in an autonomous way. It should be equipped with smart control and adaptation capabilities to relax the requirements with respect to inaccuracies in positioning or tolerance-deviations during operation. The manufacturing cell should to some extent also enable automatic reconfiguration of tasks. In this regard its design should include passively reconfigurable elements that enable fast and easy adaptation in an affordable way.

Common conditions for all applications

Main technical requirement for each application is interconnectivity with control platform and with cloud data. To achieve this interconnectivity communication protocols should be based on TCP/IP technology which can be wired or 5G-technology based and supports following I4.0 ready communication protocols:

- OPC UA,
- MQTT,
- AMQP,

-   SoAP,
-   SQL direct communication,
-   HTTPS.

Also, vertical value chains should use above mentions standard I4.0 communication protocols to enable communication with platform and with each other.

Cyber security standard ISA/IEC 62443-4-1-2018, Security for Industrial Automation and Control Systems Part 4-1: Product Security Development Life-Cycle Requirements shall be accepted as a cyber security guideline. Standard specifies process requirements for the secure development of products used in an IACS. It defines a secure development life-cycle for developing and maintaining secure products. This life-cycle includes security requirements definition, secure design, secure implementation (including coding guidelines), verification and validation, defect management, patch management and product end-of-life.

Applications, where usage of Industrial internet of things (IIOT) is planned must comply to security guidance for the IIoT from Industrial Internet Consortium Security Framework (IISF)[1]. Hardware-enforced Unidirectional Gateway solutions for cloud connectivity should be used in project proposals.

16. Tender documentation content– templates

The tender documentation consists of the documents listed below, which must comply with the forms and other instructions from the invitation in terms of content and form, ie. the tender must be prepared in accordance with the requirements of the contracting authority, signed and stamped where indicated.

These documents must be completed as required by the instructions in the form or as set out in their text. In the event that the applicant does not submit an individual required document (or does not submit it at the request of the contracting authority within the time-limit set by contracting authority, or the submitted document is contrary to the requirements of this invitation), the contracting authority will reject such a tender as inadmissible.
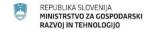
It is desirable that the required documents are arranged in the order given below. It is also desirable that all pages of the tender documentation are numbered with sequential numbers.

Num.	Form	Notes
1	Proposal template	Completed, signed and stamped
2	Applicant's statement	Completed, signed and stamped
3	Declaration of absence of conflict of interest	Completed, signed and stamped
4	Proof of Memorandum of understanding by SME and service provider	Completed, signed and stamped
5	Financial plan showing in-kind financing and financial structure, with requested voucher not being higher than 50.000 EUR	Completed, signed and stamped

[1] https://www.iiconsortium.org/pdf/IIC_PUB_G4_V1.00_PB-3.pdf

SRIPTOP
Strateško razvojno inovacijsko partnerstvo
TOVARNE PRIHODNOSTI

RAZVOJNI CENTER ORODJARSTVA SLOVENIJE
SLOVENIAN TOOL AND DIE DEVELOPMENT CENTRE

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA GOSPODARSKI
RAZVOJ IN TEHNOLOGIJO

Project is co-financed by the European Union.

6	Draft contract	Completed, signed and stamped

Celje, 16.10.2020   dr. Aleš Hančič, director of TECOS