Call for participation in ETN's additive manufacturing (L-PBF) Machine Evaluation Initiative

Additive Manufacturing technology is a key enabler for developing capabilities with innovative component designs and for reducing costs and lead time of production. Ensuring productivity and end-product quality is vital for the long term competitiveness of our industry. This collaborative project provides the opportunity to better understand the capabilities and boundaries of the technology for the energy industry by reviewing market-available solutions, with the ultimate goal to provide supportive ground to push these limits further.

ETN invites your organisation to become a partner of ETN's unique L-PBF Machine Evaluation Initiative, which was developed among members of ETN's Additive Manufacturing Working Group.

The key benefits and the value proposition of the project are summarised below:

VALUE PROPOSITION

The ETN L-PBF Machine Evaluation Initiative provides the ETN Participants(*) with a unique holistic Repository of machine's **productivity** and **quality information**:

1. Exclusive access for financers to the confidential report giving 100% transparency of the evaluation of 6 Laser Powder Bed Fusion machines
2. Unique report providing an overview of market-available equipment, with short project delivery time, based on a 5-month project timeline
3. Detailed insight in achieved results, which are in as-built condition, i.e. without post processing
4. Comparison of both Technical and Commercial KPIs, CAPEX and OPEX, including productivity (based on established standards e.g. ASTM, ISO, NF)
5. Opportunity to compare results of machines which use equal powder, for identical topologies incl. test bars & test component
6. Baseline to potentially compare your machine performance to the 6 ones of this Initiative
7. Database to potentially compare your printing performance
8. Independent reporting (by impartial 3rd party) and independent testing (all testing by single sovereign contractor)
9. Enabling an informed decision for machine procurement or contractor selection
10. Access to detailed repository/overview of all machine's technical details
11. Provides information to support qualification of the technology for users
12. Comparatively low participation cost if critical number of ETN financers is reached

(*) *Note*: Invitation to join the project consortium is limited to ETN Members.

PROJECT DESCRIPTION

The description below details the scope of the project, its future outcome and benefits.

Scope
The project will review capabilities of Laser-Powder Bed Fusion (aka L-PBF, Selective Laser Melting) equipment currently available on the market.

The involved manufacturers will be manufacturing parts with Nickel Alloy 718 powder, according to specifications written in collaboration with members of the ETN Additive Manufacturing Working Group. The parts to be produced include features of specific interest to the energy sector (e.g. thin walls, cooling channels). Performance, quality and productivity are key elements that will be evaluated.

For more details, please refer to documents presenting the specifications and assessment criteria of the project.

Outcome
The outcome of the project will consist of a detailed report, evaluating and comparing technical and commercial characteristics of selected AM machines available on the market and sample parts they produced. ***The full report will only be available to ETN consortium members.***

Machine Manufacturers
The following equipment manufacturers will participate as partners of the project:

- 3D Systems
- EOS
- Farsoon Europa
- Renishaw
- SLM Solutions
- Trumpf

Budget
Budget and cost will cover:

- Single batch of Nickel Alloy 718 powder for all equipment manufacturers ..... 42.0k€
- Production of parts[(1)] ..... *0€*
- Testing programme by a neutral organisation[(2)] ..... 73.1k€
- Third party project management, results quality insurance and reporting[(2)] ..... 41.0k€

Total: 156.1k€

[(1)] One prerequisite for machine manufacturers to join the project is to deliver evaluation parts on a voluntary basis, i.e. at no production cost for the ETN consortium.

[(2)] Involved machine manufacturers were invited to produce additional parts with the Nickel Alloy 718 powder of their choice, which would result in an extended scope for the testing programme and third party involvement. Conservatives values were selected for budget considerations.

Financial Contribution
Individual financial contribution of involved ETN Members will be calculated based on the budget divided in equal parts among consortium members.

A higher number of members involved will result in degressive individual fee:

- 5 members : 31.2k€
- 10 members: 15.6k€
- 15 members: 10.4k€
- …

Timeline
The project is scheduled for a launch in July 2021, and final report delivery in December 2021.

COMMITMENT FORM

By signing this form, you confirm commitment of your organisation to joining ETN's L-PBF Machine Evaluation Initiative project with a budget of 25,000€ or below.

Name:	**Position:**
Organisation:	**Address:**
Postcode:	**City:**
Country:	**Tel:**
Email:	**VAT number:**
Signature:	
Date:	

TERMS AND CONDITIONS

(a) Individual financial contributions will not be requested from participating Members until the number of committed ETN Participants reaches a critical number allowing individual financial contribution to reach an amount below the stated 25,000€ threshold.
(b) Official launch of the project will be announced by the ETN Office after all participating members of the project consortium have been identified and committed to the project funding.
(c) Final budget value will be communicated by the ETN Office when launching the project. The individual contribution fee will be calculated by dividing the final budget value by the number of participating members of the project consortium.
(d) If new partners join the consortium after the official launch of the project, participating members will be informed, the budget will be re-calculated, and individual contribution fee will be reduced accordingly.
(e) The individual contribution fee can be invoiced in entirety upfront at the start of the project, or in three installments upon delivery of the following deliverables:
    i. 15k€ – Nickel Alloy 718 powder purchase and delivery.
    ii. 5k€ – delivery of all produced parts by involved machine manufacturers.
    iii. 5k€ – delivery of final report
(f) Fees are payable onto the European Turbine Network's bank account as follows:
    i. IBAN code: BE66 3101 7056 0543
    ii. BIC code (Swift): BBRUBEBB
    iii. Bank Address: Chaussée de Waterloo, 687, BE-1180 Brussels.
(g) Each member of the project consortium will have access to the project's final report, as detailed in the project description.
(h) Each member of the project consortium and each participating L-PBF machine manufacturer will be required to sign a non-disclosure agreement, protecting the received data and information from undesired distribution.

About ETN Global: *ETN Global is a unique membership association bringing together the entire value chain of the gas turbine technology community globally. Through cooperative efforts and by initiating common activities and projects, ETN optimises gas turbine research and technology development and promotes environmentally sound gas turbine technology with reliable and low-cost operation.*

About ETN's Additive Manufacturing Working Group: *Members of ETN have initiated in 2018 an ETN Additive Manufacturing Working Group with the purpose to strengthen the cooperation between stakeholders of the turbomachinery value chain on additive manufacturing topics, which would ultimately allow faster and wider deployment of the technology in the gas turbine sector. This Working Group is composed of experts from across the whole gas turbine value chain: power generation and oil & gas companies, OEMs, R&D institutes, suppliers, service providers and technology consultancies.*

Organisations involved in the ETN Additive Manufacturing WG:

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