

ESIS Video recordings

ISBN: 978-88-31482-04-2



**The second European Conference on
the Structural Integrity of Additively
Manufactured Materials**

The second European Conference on the Structural Integrity of Additively Manufactured Materials – ESIAM21

Structural integrity, i.e. the fracture and fatigue strength of additively manufactured materials and components is becoming increasingly important with the technology's transition towards major industrial utilization. The conference provided an overview over current scientific knowledge and stimulated ideas for future research directions in this emerging field. ESIAM21 was the second event of the biannual international conference series held in Europe and worldwide.

Chairpersons

Filippo Berto	Department of Mechanical and Industrial Engineering, Faculty of Engineering, Trondheim, Norway
Juergen Stampfl	Institute of Materials Science and Technology. Vienna University of Technology - Vienna (Austria)
Jan Torgersen	Department of Mechanical and Industrial Engineering, Norwegian University of Science and Technology (NTNU) – Trondheim (Norway)
Luca Susmel	Structural Integrity at the Department of Civil and Structural Engineering, The University of Sheffield (UK)
Brecht Van Hooreweder	Department of Mechanical Engineering - Production Engineering, Machine Design and Automation (PMA) Section. Ku Leuven (Belgium)

Welcome message

On behalf of the European Structural Integrity Society (ESIS) TC15, the organizing committee of the Austrian University of Technology Vienna and the Norwegian University of Science and Technology, it is with great pleasure that we warmly welcome all participants to the Second European Conference on the Structural Integrity of Additively Manufactured Materials (ESIAM21).

ESIAM21 addresses an issue of utmost importance in research and industry in Europe and worldwide. With the advent of Additive manufacturing (AM) techniques, the potential to economically fabricate customized parts with complex geometries in a rapid design-to-manufacture cycle became a major driver and hope for Europe's continuing leading role in high quality manufacturing. However, before such benefits can be explored in critical load bearing applications, the basic understanding of the mechanical and functional behaviour of these materials must be substantially improved at all levels, especially in fracture and fatigue performance. The conference will shed light on the basic physical phenomena of fatigue and fracture of AM materials and the development of effective criteria for the design of unprecedented high performing components that shall play a significant role in next generation automotive, aerospace and biomedical application.

The first conference dedicated to this topic, ESIAM19, took place in Trondheim, Norway, and was a key event to bring major European and global players from research and industry together. The great impact ESIAM19 had in fostering scientific and industrial collaboration shall continue with ESIAM21. It is the immediate followup-event and marks the foundation for an upcoming series of international conferences dealing with the topic under the auspices of ESIS TC15. We are very proud to host all of you at this scientific and social event intended to contribute to the future of AM for load bearing component fabrication as well as the strategy of its industrial exploitation.

Peer-reviewed publications from conference contributions and discussions will be published in Procedia Structural Integrity.

We thank all authors for their contributions in advance and we are grateful to ESIS and the members of the international scientific committee for their hard work that will make this conference a success.

We are looking forward to welcoming you at the ESIAM21 conference in Vienna!

Filippo Berto, Jan Torgersen, Juergen Stampfl, Francesco Iacoviello, Luca Susmel and Brecht Van Hooreweder

VIDEO-PRESENTATIONS

Presentation title	Authors	DOI
Notch effect on the VHCF response of Ti6Al4V specimens produced through the SLM process	A. Tridello, F. Berto, D.S. Paolino	https://doi.org/10.53254/ESISTUBE.ESIAM21.1
Analysis of the behavior of lattice structures under low-velocity impacts: simulations and ...	M. Della Ripa, D.S. Paolino, A. Amorese, A. Tridello	https://doi.org/10.53254/ESISTUBE.ESIAM21.2
A modelling framework for fatigue-life prediction of selective laser melting additive ...	H.O. Psihoyos, Ph.D. Candidate, G.N. Lampeas, Prof. S.G Pantelakis, Prof. Emeritus	https://doi.org/10.53254/ESISTUBE.ESIAM21.3
Fatigue behaviour assessment of additive manufactured Ti-6Al-4V by means of a critical...	C. Ronchei, S. Vantadori, D. Scorza, A. Zanichelli, A. Carpinteri	https://doi.org/10.53254/ESISTUBE.ESIAM21.4
Morphology and weld Strength of a Semi-Crystalline Polymer Produced via Material Extrusion-Based ...	S. Petersmann	https://doi.org/10.53254/ESISTUBE.ESIAM21.5
Bio-Inspired Toughening of Composites in 3D-Printing	J. Stögerer	https://doi.org/10.53254/ESISTUBE.ESIAM21.6
Ink development for the fabrication of digital materials with increased fracture toughness	B. Koch, A. Hochwallner, R. Liska, J. Stampfl	https://doi.org/10.53254/ESISTUBE.ESIAM21.7
Influence of finishing in Ti6Al4V AM specimens under VHCF conditions	L. Reis, P.R. da Costa, M. Sardinha, M. Freitas	https://doi.org/10.53254/ESISTUBE.ESIAM21.8
Fatigue damage assessment in AM polymers evaluating their energy release	D. Santonocito, P. Foti, G. Risitano, F. Berto	https://doi.org/10.53254/ESISTUBE.ESIAM21.9
The use of Additive Manufactured Inconel 625 as Bipolar Plate for the High Temperature ...	J. SVendby, O. Bjelland, D. Bokach, B. G. B. Solheim	https://doi.org/10.53254/ESISTUBE.ESIAM21.10
Surface quality and fatigue behavior of L-PBF AlSi10Mg in as-built condition.	R. Konecna, F. Uriati, G. Nicoletto, T. Varmus	https://doi.org/10.53254/ESISTUBE.ESIAM21.11
The relaxation of macroscopic residual stresses in laser powder bed fused stainless steel 316L	M. Sprengel, A. Ulbricht, A. Evans, A. Krom, K. Sommer, J. Kelleher, G. Bruno, T. Kannengießer	https://doi.org/10.53254/ESISTUBE.ESIAM21.12

Presentation title	Authors	DOI
Investigation on the fatigue properties and fracture mechanical analysis of additively ...	D. Schimbäck, F. Palm, V. Holzinger, C. Plander, S. Pogatscher, S. Mayer, G. Leichfried, P. Mair, L. Kaserer	https://doi.org/10.53254/ESISTUBE.ESIAM21.13
Influence of Surface Finish and Build Orientation on the Fatigue Performance of Laser Powder Bed ...	R. Lancaster, W. Breardm, N. Barnard, J. Adams, T. Jones	https://doi.org/10.53254/ESISTUBE.ESIAM21.14
Investigations on the rheology and deagglomeration of digital light processing based ...	A.L. Kutsch	https://doi.org/10.53254/ESISTUBE.ESIAM21.15
Optimization and Redesign of a Structurally Loaded Fused Filament Fabrication Component ...	S. van den Boom, S. Dragt, D. van Veen, E. van Daelen, J. Berens	https://doi.org/10.53254/ESISTUBE.ESIAM21.16
Microstructural features of thick-walled 316LSi produced by wire arc additive manufacturing	L. Palmeira Belotti, J.A.W. van Dommelen, M.G.D. Geers, C. Goulas, W. Ya, J.P.M. Hoefnagels	https://doi.org/10.53254/ESISTUBE.ESIAM21.17
Mechanical behavior of engineered open porous Ti6Al4V structures produced by laser powder bed fusion	L. Vanmunster, C. D'Haeyer, P. Coucke, A. Braem, B. Van Hooreweder	https://doi.org/10.53254/ESISTUBE.ESIAM21.18
Mechanical Behavior of Maraging Steel Produced by SLM	T.E.F. Silva, F. Silva, J. Xavier, A. Gregório, A. Reis, P. Rosa, P. Konopík, M. Rund, A.M.P. de Jesus	https://doi.org/10.53254/ESISTUBE.ESIAM21.19
An engineering approach to estimate fatigue thresholds of wrought and additively manufactured ...	G. Meneghetti, D. Rigon	https://doi.org/10.53254/ESISTUBE.ESIAM21.20
Nominal stresses to assess damage in notched additively manufactured steel subjected to constant ...	L. Susmel	https://doi.org/10.53254/ESISTUBE.ESIAM21.21
Fatigue crack growth parameters of Laser Powder Bed Fusion produced Ti-6Al-4V	N. Macallister, K. Vanmeensel, T.H. Becker	https://doi.org/10.53254/ESISTUBE.ESIAM21.22
TopFat methodology implemented in a commercial software: benchmarking validation	R. Caivano, A. Tridello, D. Paolino, F. Berto	https://doi.org/10.53254/ESISTUBE.ESIAM21.23
Damage tolerance and fracture properties in fused filament fabrication - trends; ...	F. Arbeiter	https://doi.org/10.53254/ESISTUBE.ESIAM21.24

Presentation title	Authors	DOI
The effect of printing parameters on fatigue life of 3D printing ABS under thermo-mechanical loads	F. He, Y.L.A. Alshammari, M. Khan	https://doi.org/10.53254/ESISTUBE.ESIAM21.25
Representative Structure Elements for the fatigue assessment of additively manufactured components	R. Wagener, M. Hell, A. Chiocca	https://doi.org/10.53254/ESISTUBE.ESIAM21.26
Experimental and numerical analysis of fatigue cracks emanating from internal defects in Ti6Al4V SLM	S. Aguado-Montero, C. Navarro, J. Vázquez, J. Domínguez	https://doi.org/10.53254/ESISTUBE.ESIAM21.27
Compressive behavior of gyroid structures manufactured through SLM with carburizing steels ...	G. Guimarães, A. Rocha de Faria, R. Rego, L. Robatto, J. Mascheroni, A. Kretzer	https://doi.org/10.53254/ESISTUBE.ESIAM21.28
Fatigue crack growth of TiAl6V4 parts produced by SLM under biaxial mode I/mode II loading	L. Borrego, J. Jesus, J.A.M. Ferreira, C. Capela, J.D. Costa	https://doi.org/10.53254/ESISTUBE.ESIAM21.29
Characterising crack growth in ScAlm alloy	R. Jones	https://doi.org/10.53254/ESISTUBE.ESIAM21.30
Effect of in-situ laser remelting of inclined surfaces on fatigue performance of additively...	D. Ordnung, J. Metelkova, A. Cutolo, B. Van Hooreweder	https://doi.org/10.53254/ESISTUBE.ESIAM21.31
Cyclic deformation and fatigue behaviour of titanium alloy Ti-6Al-4V built by directed energy ...	A.K. Syed, M. Hill, R. Plaskitt, X. Zhang	https://doi.org/10.53254/ESISTUBE.ESIAM21.32
Isolating Lacunar Morphology to Study the Influence of Bone Lacunar Network in Damage Progression	F. Buccino, S. Bagherifard, M. Ghidini, C.A. Biffi, L.M. Vergani	https://doi.org/10.53254/ESISTUBE.ESIAM21.33
A first step in the development of dense metallic architected materials by additive manufacturing	F. Hannard, F. Cren, M. Marteleur, C. van de Rest, T. Pardoën, A. Simar	https://doi.org/10.53254/ESISTUBE.ESIAM21.34
Enhancement of the mechanical behavior of L-PBF Al alloys by optimized thermomechanical ...	C. van da Rest, J.G. Santos Macías, L. Zhao, A. Smits, A. Simar	https://doi.org/10.53254/ESISTUBE.ESIAM21.35
Difference in mechanical behavior of glass bead reinforced polyamide 12 specimens produced by ...	H. De Coninck, S. Meyers, B. Van Hooreweder	https://doi.org/10.53254/ESISTUBE.ESIAM21.36
Efficient optimization methodology for laser powder bed fusion parameters to manufacture dense ...	J. Gheysen, M. Marteleur, C. van der Rest, A. Simar	https://doi.org/10.53254/ESISTUBE.ESIAM21.37

Presentation title	Authors	DOI
Static and fatigue behaviour of laser welded additively manufactured 17-4 PH steel plates	R. Sepe, V. Giannella, V. Alfieri, F. Caiazzo	https://doi.org/10.53254/ESISTUBE.ESIAM21.38
Phase separation in (Meth)acrylate-based photopolymers	M. Ahmadi	https://doi.org/10.53254/ESISTUBE.ESIAM21.39
Molecular Dynamics Simulation of the Mechanical Properties of Photopolymers used in 3D-Printing	A. Hochwallner, J. Stampfl	https://doi.org/10.53254/ESISTUBE.ESIAM21.40
A roughness study by modelling L-PBF surfaces	O. Pencelet, C. van der Rest, M. Marteleur, A. Simar	https://doi.org/10.53254/ESISTUBE.ESIAM21.41
Lithographic additive manufacturing of defined open-porous tricalcium phosphate scaffolds	M. Schwentenwein	https://doi.org/10.53254/ESISTUBE.ESIAM21.42
2D characterization at sub-micron scale of crack propagation on 17-4PH parts produced by ...	C. Gong, J.M. Djouda, A. Hmima, F. Gaslain, M. Chemkhi, T. Maurer, B. Panicaud	https://doi.org/10.53254/ESISTUBE.ESIAM21.43
The effect of Hot Isostatic Pressing (HIP) on the fatigue behavior of particle reinforced ...	S. Senol, M. Soulier, K. Vanmeensel	https://doi.org/10.53254/ESISTUBE.ESIAM21.44
The role of simulation in the industrialization of Additive Manufacturing	N. Lammens, F. Gallego-Bordallo, J. Ni, A. Zinoviev, T. De Weer, H. Erdelyi	https://doi.org/10.53254/ESISTUBE.ESIAM21.45
Influence of the composite structural parameters on the mechanical performance of additively ...	R. Falck, S. Amancio	https://doi.org/10.53254/ESISTUBE.ESIAM21.46
ESIAM21 Diaz ModellingHydrogenation	A. Díaz, I.I. Cuesta, J.M. Alegre	https://doi.org/10.53254/ESISTUBE.ESIAM21.47
Material Characterization of 3D-printed Silicone Elastomers	V.M. Miron, S. Lämmermann, U. Çakmak, Z. Major	https://doi.org/10.53254/ESISTUBE.ESIAM21.48
Digital Materials: the new dimension of 3D-printing	S. Baumgartner, J. Stampfl	https://doi.org/10.53254/ESISTUBE.ESIAM21.49
Design; production; and fatigue testing of an optimized structural component made of L-PBF AlSi10Mg	L. Zambrelli, G. Nicoletto, M. Garibaldi	https://doi.org/10.53254/ESISTUBE.ESIAM21.50

Presentation title	Authors	DOI
Optimization of tensile properties for 3D printed PLA material using Taguchi and ANOVA methodologies	A.R. Kafshgar, S. Rostami, M.R.M. Aliha, F. Berto	https://doi.org/10.53254/ESISTUBE.ESIAM21.51
A comprehensive numerical framework to study the effect of process parameters on cold Spray ...	A.A. Lordejani, S. Bagherifard, D. Colzani, M. Guagliano	https://doi.org/10.53254/ESISTUBE.ESIAM21.52
Tough and damage tolerant composites for bi-axial loading	D. Brescakovic, O. Kolednik	https://doi.org/10.53254/ESISTUBE.ESIAM21.53
Quasi-static behaviour of 3D printed lattice structures of various scales	Z. Xu, E. Medori, F. Sarasini, F. Berto, S.M.J. Razavi	https://doi.org/10.53254/ESISTUBE.ESIAM21.54
Scale and thickness effect on the mechanical behavior of structural parts fabricated via ...	Z. Xu, R. Fostervold, S.M.J. Razavi	https://doi.org/10.53254/ESISTUBE.ESIAM21.55
Additive manufacturing of continuous carbon fiber reinforced polyamide 6: The effect of process ...	H. Oberlercher	https://doi.org/10.53254/ESISTUBE.ESIAM21.56
3D-printed continuous fiber reinforced polymers considering material and physical variability ...	C. Becker, P. Lardeur, P. Nicolay, F. Druesne	https://doi.org/10.53254/ESISTUBE.ESIAM21.57
Effects of hybrid post-treatments on fatigue behavior of notched LPBF AISi10Mg: experimental ...	E. Maleki, S. Bagherifard, F. Sabouri, M. Guagliano	https://doi.org/10.53254/ESISTUBE.ESIAM21.58
Productivity-oriented process parameters effect of the fatigue strength of SLMed Inconel 718	G. Macoretta, B.D. Monelli	https://doi.org/10.53254/ESISTUBE.ESIAM21.59
Optimizing a gas diffusion layer with mathematically defined structures	S.O.F. Hoem, J. Torgersen, R. Bock	https://doi.org/10.53254/ESISTUBE.ESIAM21.60
Residual stresses in AISI 316L and 18Ni300 steels produced by selective laser melting	M.J. Marques, A.C. Batista, J.P. Nobre, F. Fiorentin, A.M.P. Jesus	https://doi.org/10.53254/ESISTUBE.ESIAM21.61
Unravelling the fatigue behavior of high strength aluminum lattice structures produced by laser ...	A. Cutolo, E. Beevers, F. Mertens, B. Van Hooreweder	https://doi.org/10.53254/ESISTUBE.ESIAM21.62
Static and fatigue behavior of 3D printed virgin and recycled short-glass-fiber reinforced and ...	D. Rigon, F. Florian, G. Ardengo, F. Trivillin, G. Meneghetti	https://doi.org/10.53254/ESISTUBE.ESIAM21.63
Hot cracking suppression by powder modification of an	N. Nothomb, M. Delmée, J. Gheysen, B.	https://doi.org/10.53254/ESISTUBE.ESIAM21.64

Presentation title	Authors	DOI
Al7075 alloy produced by laser ...	Van Hooreweder, A. Simar	
Additive manufactured marine component - NiAl bronze propeller	R.B. Govindaraj, E. Junghans, I. Andersen, Y.K. Lim, P. Lindström	https://doi.org/10.53254/ESISTUBE.ESIAM21.65
Production Assessment of Hybrid Directed Energy Deposition Manufactured Fatigue Sample With ...	Z. Jardon	https://doi.org/10.53254/ESISTUBE.ESIAM21.66
Search for potential inhibitors of acid corrosion of steel in a series trihalomethyl-1;3-diketones	A. Botin	https://doi.org/10.53254/ESISTUBE.ESIAM21.67
Fatigue assessment of laser beam welds between AlSi10Mg AM-structures and conventionally ...	B. Möller	https://doi.org/10.53254/ESISTUBE.ESIAM21.68
Numerical modeling and prediction of residual stresses in AISI 316L and 18Ni300 steels produced ...	J.W. Gil, F.K. Fiorentin, M.J. Marques, A.C. Batista, J.P. Nobre, A.M.P. Jesus	https://doi.org/10.53254/ESISTUBE.ESIAM21.69
Full process chain simulation of the (wire-based) laser metal deposition process towards fatigue ...	T.P.A. Koenis, W.M. van den Brink, M. Bosman	https://doi.org/10.53254/ESISTUBE.ESIAM21.70
Characterization of the Fatigue Behaviour of SLS Thermoplastics	Z. Major, M. Lackner, E. Heiml, A. Hössinger-Kalteis, T. Lück	https://doi.org/10.53254/ESISTUBE.ESIAM21.71
Recent advances in 3D-printing of continuous carbon fibre reinforced polymers	F.O. Riemelmoser, C. Becker, A. Berndt, R.B. Heim, L.M. Faller, K. Ibrahim, M. Laux, H. Oberlercher	https://doi.org/10.53254/ESISTUBE.ESIAM21.72
Characterization of 3D printed ABS specimens under static and cyclic loadings	C.M. Ferreira, C.M.S. Vicente, M. Sardinha, M. Leite, L. Reis	https://doi.org/10.53254/ESISTUBE.ESIAM21.73
Effect of scan strategy on γ -TiAl based composite fabricated by selective electron beam melting	B. Gao, Y. Liang, J. Lin, B. Chen	https://doi.org/10.53254/ESISTUBE.ESIAM21.74
Finish-pass strategy to improve sidewall angle and processing time in FIB milled structures	M.J. Lid, A.B. Afif, J. Torgersen, F. Prinz	https://doi.org/10.53254/ESISTUBE.ESIAM21.75
Additive manufacturing of continuous carbon fiber tubes and experimental investigation of the...	A. Berndt	https://doi.org/10.53254/ESISTUBE.ESIAM21.76

Presentation title	Authors	DOI
Cost-effective Characterization of the Fatigue Behavior of PBF Metals	G. Nicoletto	https://doi.org/10.53254/ESISTUBE.ESIAM21.77
Selective Electron Beam Melted Non-weldable Ni-base Superalloy	B. Chen	https://doi.org/10.53254/ESISTUBE.ESIAM21.78
Residual stresses in AISI 316L and 18Ni300 steels produced by selective laser melting	M.J. Marques, A.C. Batista, J.P. Nobre, F. Fiorentin, A.M.P. Jesus	https://doi.org/10.53254/ESISTUBE.ESIAM21.79
Fatigue strenght mechanism under torsional loads of aluminim alloy AISi10Mg obtained by L-PBF	F. Sausto, S. Beretta, P. Carrion, N. Shamsaei	https://doi.org/10.53254/ESISTUBE.ESIAM21.80
Design of 3D printed polymer-polymeric tribological units made of wear-resistant composite ...	S. Panin, V. Alexenko, D. Buslovich, Y. Dontsov, L. Kornienko, S. Bochkareva	https://doi.org/10.53254/ESISTUBE.ESIAM21.81
Additive Manufacturing of Micro Architecture Composite - Metal Joints for Renewable Energy ...	S. Lotfian	https://doi.org/10.53254/ESISTUBE.ESIAM21.82

