

**Combined Deliverable
D6.3-36 and D6.1-36b**

“Report on final workshop”

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The work described in this document was performed as part of the DJINN project (Decrease Jet Installation Noise), which is funded by the European Union under the Grant Agreement **GA 861438**.

The EU DJINN project is a collaborative effort between CFD-Berlin (coordinator), Airbus SAS, Dassault Aviation, Safran Aircraft Engines, Rolls-Royce Deutschland, ONERA, DLR, University of Southampton, CERFACS, Imperial College London, von Karman Institute, CNRS, and Queen Mary University of London.

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1 Remarks

- Even though it was initially mentioned to have two separate deliverables, D6.3-36 and D6.3-36b that should be, moreover, combined with D6.3-19, the current deliverable solely presents the results stemming from the “final Workshop”, called below as the “DJINN-ENODISE Conference”. The reason is upon the close relation between D6.3-36 and D6.3-36b. Because of clarity, this deliverable will not repeat what has been presented in D6.3-19 already.
- As mentioned in D6.3-19, two test cases have been identified (by CNRS and SOTON), that can be run both as isolated and installed applications. These cases have been presented during the first DJINN conference by two special presentations at the beginning of the conference and have been made available through the DJINN website. Unfortunately, no numerical results or further contributions have been provided at the DJINN-ENODISE conference, although several downloads of test case information have been monitored.
- This deliverable should also be taking care of the ERCOFTAC data exchange issues, it is decided NOT to place it here again, as all information is already part of deliverable D1.4-18. All relevant information can be taken from there.

2 The DJINN-ENODISE Conference

Early in 2023 it was decided to join with the partner project ENODISE and go for a joint conference in order to attract more colleagues from outside, based on the different topics in the DJINN and in the ENODISE project. With the main reason to go for a combined conference, rather than two different workshops, the organising committee:

- **W. Haase**, (DJINN), CFD-Software GmbH, DE
- **U. Michel**, (DJINN), CFD-Software GmbH, DE
- **M. T. Ramandi**, (ENODISE), von Karman Institute for Fluid Dynamics, BE
- **Ch. Schram**, (ENODISE), von Karman Institute for Fluid Dynamics, BE
- **F. Thiele**, (DJINN), CFD-Software GmbH, DE

started the initiative by selecting a conference venue, sending out flyers, reaching out for conference supporters, and inviting well-known scientists for presenting keynote lectures, as there were:

- **Dr. Doug Boyd (NASA)** “Characterization of Urban Air Mobility Vehicle Operational Noise and Community Noise Impact”
- **Dr. Leandro Rego (Capgemini Engineering)** “Passive Strategies for Reducing Jet Installation Noise”
- **Prof. Kyriakos Giannakoglou (National Technical University of Athens)** “Continuous Adjoint in Shape Optimization, with applications in Aeroacoustics”
- With the special participation of **Dr. Leonidas Siozos-Rousoulis (CINEA)** presenting “The contributions of H2020 projects DJINN and ENODISE to EU-funded aviation noise research”

2.1 The Flyer

To send out a flyer and updating it was a major concern, as it based on a pre-calculation of the conference fees as well as on the definition of the conference topics, the supporters and the invited lecturers. Hence several versions have been issued, the last but final one (the last one concentrated on the programme already, see farther below for that) presenting all topics mentioned read:



This conference aims to provide an open discussion platform for scientists interested in the field of aeroacoustics and noise reduction as well as an opportunity to share and discuss some of the results generated within the DJINN and ENODISE projects with a wider scientific audience. Therefore, the key ambition is tied to the provision of advanced tools for coupled aerodynamics-aeroacoustics to enable design optimisation in future industrial environments and to reach a new level of noise reduction through highly collaborative effort – with the main innovative objectives targeting industrial needs.

DJINN (Decrease Jet Installation Noise) is a project funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 861438. The project aims to develop a new generation of reliable computational fluid dynamics (CFD) technologies for assessing promising noise-reduction technologies, with support and validation from reduced-scale experiments. It is a collaboration between CFD Berlin (coordinator), AIRBUS, Dassault, SAFRAN, RRD, ONERA, DLR, SOTON, CERFAQS, ICL, VKI, CNRS, and QMUL.

ENODISE (Enabling Optimized Disruptive Airframe Propulsion Integration Concepts) is a project funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No 860103. The project aims to reduce aircraft gaseous and noise emissions by improving the integration of the propulsion system with the airframe. It focuses on investigating the main propulsion airframe integration issues at low TRL and on building a solid basis of knowledge and methods based on simplified but representative configurations, permitting the assessment of a variety of integration concepts. It is a collaboration between VKI (coordinator), DLR, ECL, TU Delft, GPUP, NLR, ONERA, PVS, RWTH, Siemens, Bristol University, UNIROMA 3, and U. Twente.

THIS CONFERENCE IS ORGANIZED WITH THE SUPPORT OF:



Organizing Committee

W. Haase, (DJINN), CFD-Software GmbH, DE
 U. Michel, (DJINN), CFD-Software GmbH, DE
 M. T. Ramandi, (ENODISE), von Karman Institute for Fluid Dynamics, BE
 Ch. Schram, (ENODISE), von Karman Institute for Fluid Dynamics, BE
 F. Thiele, (DJINN), CFD-Software GmbH, DE

REGISTRATION

Please register via EVENTBRITE through the DJINN website (djinn.online) or the ENODISE website (vki.ac.be/index.php/about-enodise). For quick access, you can use the QR Code below, which will guide you to the DJINN website:



Deadline for registrations: 12 November 2023

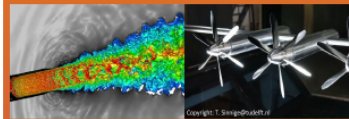
Registration fees: EUR 450 per participant (They cover coffee breaks, lunches, the conference dinner on 23/11 and a digital book of abstracts)

Venue: HdW/bw - Bildungswerk der Wirtschaft in Berlin und Brandenburg, Am Schillertheater 2, 10625 Berlin

THE DJINN - ENODISE CONFERENCE



Aeroacoustic Installation Effects in Conventional and New Aircraft Propulsion Systems



22 - 24 November 2023
 Berlin, Germany



THE DJINN - ENODISE CONFERENCE

This conference aims to provide an open discussion platform for scientists interested in the field of aeroacoustics and noise reduction as well as an opportunity to share and discuss some of the results generated within the DJINN and ENODISE projects with a wider scientific audience. Therefore, the key ambition is tied to the provision of advanced tools for coupled aerodynamics-aeroacoustics to enable design optimisation in future industrial environments and to reach a new level of noise reduction through highly collaborative effort – with the main innovative objectives targeting industrial needs

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CALL FOR NUMERICAL & EXPERIMENTAL CONTRIBUTIONS

Contributions by participants are expected by **8 October 2023** on the following topics:

- Aerodynamic and aeroacoustic installation effects in non-conventional aircraft architectures.
- UHBR jet-airframe hydrodynamic and acoustic interactions.
- Jet-airframe interaction noise technologies including flow-control techniques
- Innovative noise reduction technologies through shape optimization, surface treatments, add-ons, active control, ...
- 'Design-to-noise' capabilities for jet-airframe interaction noise of under-wing and rear-fuselage mounted engines.
- Improved solvers, highly adapted meshes for complex geometries, improved processing of data ('co-processing'), high-performance computing (HPC) to reduce wall-clock times
- Advanced multi-fidelity modelling approaches for 'rapid design' of conventional and UAM aircraft.
- Multi-disciplinary optimization.

Abstracts can be uploaded via the dedicated conference page on the DJINN website.

KEYNOTE SPEAKERS

- Dr Doug Boyd (NASA) "Characterization of Urban Air Mobility Vehicle Operational Noise and Community Noise Impact"
- Dr Leandro Rego (Capgemini Engineering) "Passive Strategies for Reducing Jet Installation Noise"
- Prof. Kyriakos Giannakoglou (National Technical University of Athens) "Continuous Adjoint in Shape Optimization, with applications in Aeroacoustics"

With the special participation of Dr Leonidas Siozos-Rousoulis (CINEA) presenting "The contributions of H2020 projects DJINN and ENODISE to EU-funded aviation noise research"

SCIENTIFIC COMMITTEE

- M. Andrejasic, PVS, Slovenia;
- U. Michel, CFD-Berlin, Germany;
- M. Azarpeyvand, UBRI, UK;
- M. Roger, ECL, France;
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- D. Ragni, TU Delft, Netherlands;
- P. Jordan, CNRS/Univ. Poitiers, France;
- L. Siozos-Rousoulis, CINEA, Belgium;
- S. Karabasov, Queen Mary College London, UK;
- M. Tunistra, NLR, Netherlands;
- J. Lawrence, Southampton University, UK;
- K. Venner, UTWE, Netherlands;
- M. Meinke, RWTH, Germany.

Organizing Committee

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- Ch. Schram, (ENODISE), von Karman Institute for Fluid Dynamics, Belgium
- F. Thiele, (DJINN), CFD-Software GmbH, Germany

2.2 The Programme

The conference programme has been published well ahead of the conference and contained 35 presentations in total:

PROGRAMME	
22 NOVEMBER 2023	
08:30	Registration
09:00	Welcome Werner Haase (CFD) & Christophe Schram (VKI)
09:10	Keynote: Passive strategies for reducing jet installation noise - Leandro Rego (Caggemini Engineering, FR) - Chair: J. Christophe (VKI, BE)
Session 1 - Chairman: J. Christophe (VKI, BE)	
09:50	Control of free and installed jets and their sound - D. Audiffred (ITA, BR), M. Mancinelli (Uniroma3, IT), U. Karban (METU, TU), A. V.G. Cavaliere (ITA, BR), E. Martini (ENSMa, FR), I. Maia (ITA, BR), P. Jordan* (Institute Pprime, FR)
10:15	Flexible trailing edge as a passive noise reduction device for installed jet noise - M. Mancinelli* (Uniroma3, IT), P. Jordan (Institute Pprime, FR), M. Nilton (UFSJ, BR), A. V.G. Cavaliere (ITA, BR), A. Lebedev (Institute Pprime, FR)
10:40	Coffee
Session 2 - Chairman: L. Rego (Caggemini Engineering, IT)	
11:10	Noise generation by cylinders in turbulent flow - T. Geyer*, L. Enghardt (DLR, Cottbus, DE), A. Lucius, M. Schneider (ebm-papst Mulfingen GmbH, DE)
11:35	Isolated jet noise cross-comparison in various EU small and mid-size test facilities and geometric far-field - C. Jente* (DLR Braunschweig, DE), H. Siller (DLR, Berlin, DE), J. Christophe (VKI, BE), J. Lawrence (Southampton, UK)
12:00	Preliminary investigations of jet installation noise influenced by a vortex-generating liner at the nozzle inner wall - H. Siller*, W. Hage, A. Bassetti (DLR, Berlin, DE)
12:25	Lunch
Session 3 - Chairman: R. Ewert (DLR, DE)	
13:40	ARANS-based reduced-order model for jet-surface interaction noise - F. de Souza* (U. Southampton, UK/UFU, BR), J. Lawrence (U. Southampton, UK)
14:05	Assessment of jet flap interaction in the Odin Cleansky2 project - G. Page*, H. Xia, A. Barnes (U. Loughborough, UK)
14:30	On the noise sources of jet and wing interactions: a LES-RANS study - Z.N. Wang* (U. Birmingham, UK), J. Tyacke (Brunel U., UK), P. Tucker (Cambridge, UK)
14:55	Experimental installed jet databases including noise mitigation - J. Christophe* (VKI, BE), C. Jente (DLR Braunschweig, DE), H. Siller (DLR, Berlin, DE), J. Lawrence (U. Southampton, UK)
15:20	Coffee
Session 4 - Chairman: D. Lindblad (CFD-Berlin, DE)	
15:50	High-fidelity flow and noise simulation of a double-stream jet installed in a T-tail configuration - F. Sartor, M. Huet*, T. Renaud, F. Gand (ONERA, FR)
16:15	Robust regularization of the boundary integral method for noise scattering - D. Lindblad*, M. Höchel, U. Michel (CFD-Berlin, DE), H. Xia (U. Loughborough, UK)
16:40	Toward realistic jet-installation noise prediction using LBM - G. Daviller*, F. Renard, E. Charles, J. F. Boussuge (CERFACS, FR)
17:05	Compressible Large Eddy Simulation of UHBR jet installation noise using Octree-Cartesian grids: wind tunnel vs. free-flying aircraft comparison - J. Dierke, M. Moßner, R. Ewert* (DLR, DE)
23 NOVEMBER 2023	
09:00	Keynote: Community Noise Impact of Urban Air Mobility Vehicle Operations - Doug Boyd (NASA Langley Research Center, US) - Chair: Ch. Schram (VKI, BE)
Session 5 - Chairman: Ch. Schram (VKI, BE)	
09:40	Experimental investigation of the noise emitted by two different propellers ingesting a planar boundary layer - M. Falsi* (Uniroma3, IT), I. Zaman (Bristol, UK), M. Mancinelli, S. Meloni (Uniroma3, IT), B. Zang (Bristol, UK), R. Camussi (Uniroma3, IT), M. Azarpayvand (Bristol, UK)
10:05	Acoustic interference between three distributed propellers - T. Lade*, S. Guerin (DLR, Berlin, DE)
10:30	Numerical analysis of tonal noise emissions from shrouded and unshrouded contra-rotating propellers - J. E. Barker*, A. Zarrì, J. Christophe, Ch. Schram (VKI, Belgium)
10:55	Coffee
Session 6 - Chairman: H. Siller (DLR, DE)	
11:25	Experimental aeroacoustic assessment of coaxial drone propellers - E. Gallo*, J. De Decker, P. Haezebrouck, Ch. Schram (VKI, BE)
11:50	Experimental acoustic characterisation of the propeller BLI configuration for zero and adverse pressure gradient boundary layers - I. Zaman* (Bristol, UK), M. Falsi (Uniroma3, IT), F. Ahmed, B. Zang, M. Azarpayvand (Bristol, UK)
12:15	Aeroacoustics of stacked UAV rotors - progress on computational and experimental study - A. Sieradzki, P. Keki-Kumor*, W. Klimczyk (Lukasiewicz Research Network, PL)
12:40	Lunch
13:55	Keynote: The contributions of H2020 projects DJINN and ENODISE to EU-funded aviation noise research - Dr. Leonidas Siozos-Rousoulis (CINEA, EU Commission) - Chair: F. Thiele (CFD-Berlin, DE)
Session 7 - Chairman: A. Zarrì (VKI, BE)	
14:20	Experimental investigation of the influence of boundary layer ingestion on turbo-fan noise generation - U. Tapken*, R. Meyer, L. Klähn, M. Behn (DLR, Berlin, DE)
14:45	Numerical investigation of propeller-airfoil interaction noise based on large-eddy simulation and FW-H method - Z. Yang*, M. Meinke, W. Schröder (RWTH, DE)
15:10	Fast non-empirical rotor noise prediction model for installed propellers - A. Franco*, S. M. Alavi Moghadam, M. Moßner, J. Dierke, R. Ewert, J. W. Delfs (DLR Braunschweig, DE)
15:35	Noise emissions from installed propeller-wing configurations using mid-fidelity unsteady panel method coupled to FW-H equation-based solver - J. Manghani*, R. Ewert, J. Delfs, V. Domogalla (DLR Braunschweig, DE)
16:00	Coffee
Session 8 - Chairman: D. Boyd (NASA LARC, USA)	
16:30	Analytical study of the unsteady aerodynamic noise radiated by distributed electric propulsion systems - D. Acevedo-Giraldo*, M. Roger, M. Jacob (ECL, FR), S. Le Bras (Siemens, FR), K. Kucukcoskun (Siemens, BE)
16:55	Numerical investigation of propeller boundary layer ingestion noise using CABARET on rotating meshes - H. A. Abid, A. Markestijn, I. Solntsev, S. A. Karabasov (GPUP, UK)
17:20	Boundary layer ingested ducted fans: an experimental aeroacoustics study - F. Ahmed*, I. Zaman, D. Rezzig, M. Azarpayvand (U. Bristol, UK)
17:45	Post-test noise predictions for a low-speed fan stage with inflow distortion - L. Klähn*, R. Meyer, L. Caldas, S. Guérin, U. Tapken (DLR Berlin, DE)
19:30	Conference dinner
24 NOVEMBER 2023	
09:00	Keynote: Continuous adjoint in shape optimization, with applications in aeroacoustics - Kyriakos Giannakoglou (NTUA, GR) - Chair: W. Haase (CFD-Berlin, DE)
Session 9 - Chairman: W. Haase (CFD-Berlin, DE)	
09:40	A semi-automatic toolchain with large eddy simulations accelerated on graphics processing units for rapid modelling of jet installation noise - A. Markestijn, S. Karabasov* (GPUP, UK)
10:05	Reduced order modelling of a Reynolds number 106 jet flow using machine learning approaches - A. R. Murail* (ECL, FR), V. Gvozdev, A. Markestijn (QMUL, UK), S. E. Naghibi (UEL, UK), V. Toropov (QMUL, UK), M. Jacob (ECL, FR), S. Karabasov (QMUL, UK), V. Riabov (FUH, JP)
10:30	Coffee
Session 10 - Chairman: S. Karabasov (GPUP, UK)	
11:00	Hybrid LES-RANS of flight effects on installed jet noise including fuselage - J. C. Tyacke* (Brunel, UK), Z. N. Wang (Birmingham, UK), P. G. Tucker (Cambridge, UK)
11:25	Noise radiation of an aircraft wing next to an engine jet using the curle integral and results of a scale-resolving simulation - U. Michel*, D. Lindblad, M. Höchel (CFD-Berlin, DE)
11:50	Numerical investigation of jet noise sources with a virtual microphone array technique - H. Demontis*, M. Huet (ONERA, FR)
12:15	Source localization and far-field extrapolation for wind-tunnel measurements of jet installation noise - A. Bassetti*, S. Oertwig, H. Siller (DLR, DE)
12:40	Farewell lunch

2.3 The Conference itself

The DJINN-ENODISE Conference on "Aeroacoustic Installation Effects in Conventional and New Aircraft Propulsion Systems" took place in Berlin on 22-24 November 2023. The organisers would like to mention, that this conference could not have happened without the support of the European Commission (by funding the DJINN and ENODISE projects via the H2020 programme) and the sponsorship of

- CFDB
- VKI
- ERCOFTAC
- Euroturbo
- Pulsar
- ISIMQ and
- ECCOMAS

which promoted the conference via their own networks and to which the DJINN and ENODISE Consortia express their profound gratitude.

The conference programme, spread over two days and a half, featured the three keynote speakers given above, presentations from researchers from the DJINN and ENODISE consortia as well as from external

institutions, and an address from the DJINN and ENODISE's Project Officer, Dr Leonidas Siozos-Rousoulis on the two projects' contribution to the EU-funded aviation noise research.

Given the complementarity between the research activities carried out in ENODISE and in the cluster project DJINN, the DJINN-ENODISE Conference provided a great opportunity for scientists working in the fields of aeroacoustics and noise reduction to come together and exchange ideas.

In total, 55 people attended the conference, from 9 different countries, as there is Belgium, France, Greece, Italy, The Netherlands, Poland, Sweden, United Kingdom, and the US - accompanied by authors from Brazil, Turkey, and Japan.

All information with respect to the conference details have been and still are available via the DJINN website, abstracts have been made available prior to the conference utilising public download, as well as all presentations. The latter ones are (only!) available to the conference participants and have been secured by a password – which was distributed amongst the participants.

3 The DJINN-ENODISE CONFERENCE – Final Notes

As said above, all presentations are available for the participants on the DJINN website (Conference tab), but it should be noted that access to this page will be closed by the end of January 2024 because of data security reasons.

Nevertheless, all participants have been informed that in case of later interest in a certain publication, the DJINN coordinator will distribute the required presentation(s) on demand.

The conference, providing a proper ground for scientific discussions and acquaintances, did receive very positive response from all participants. Although noise reduction aspects focussing on "Aeroacoustic Installation Effects in Conventional and New Aircraft Propulsion Systems" are forming a somewhat restricted scientific area, the number of 55 conference participants with 35 presentations are overwhelming.



We cordially thank all colleagues involved in making this conference a success.