



Funded by
the European Union



Cost Action CA18203 - Optimizing Design for Inspection (ODIN)

PRACTICAL INFORMATION GUIDE TECHNICAL PROGRAMME



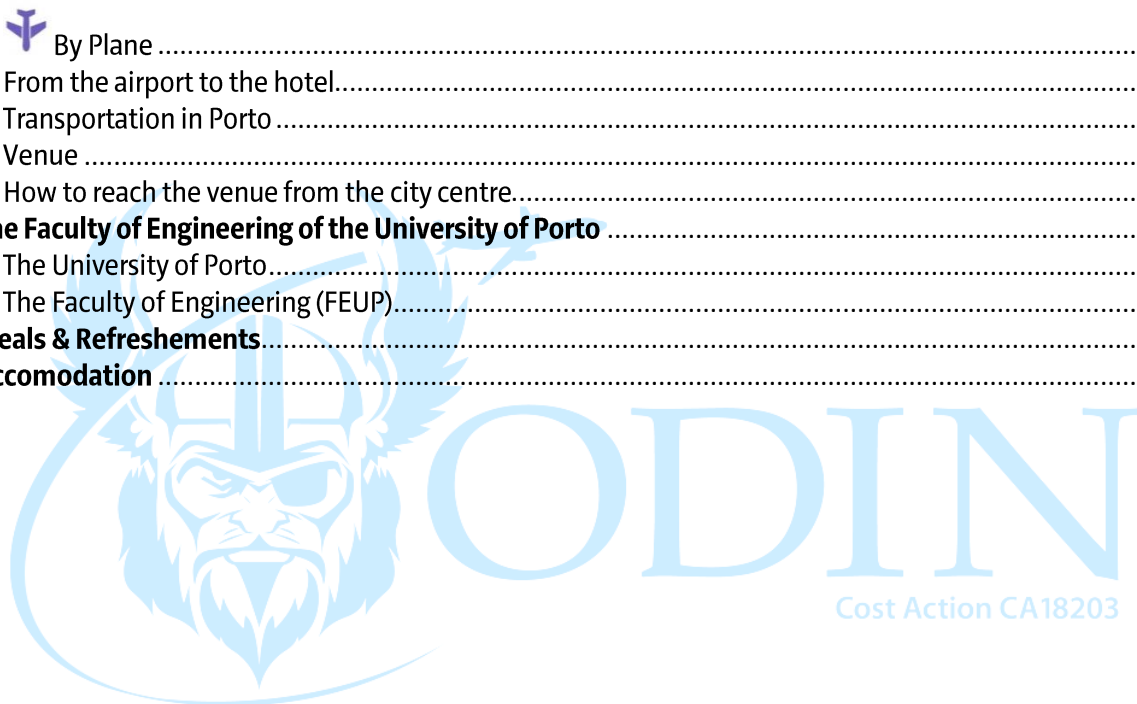
Final MC meeting and Workshop

Faculty of Engineering, University of Porto
Rua Dr. Roberto Frias, 4200-465 Porto
Portugal

Date: 14-16 February 2024

Contents

| | |
|--|----|
| About COST..... | 3 |
| Cost Action CA18203 - Optimizing Design for Inspection (ODIN)..... | 4 |
| Action's Working Groups | 5 |
| Agenda | 6 |
| Porto | 7 |
| Some city highlights..... | 7 |
| Currency and time zone | 9 |
| How to reach Porto | 9 |
| ✈ By Plane | 9 |
| From the airport to the hotel..... | 9 |
| Transportation in Porto | 10 |
| Venue | 11 |
| How to reach the venue from the city centre..... | 11 |
| The Faculty of Engineering of the University of Porto | 12 |
| The University of Porto..... | 12 |
| The Faculty of Engineering (FEUP)..... | 12 |
| Meals & Refreshments | 13 |
| Accommodation | 13 |



About COST

The European Cooperation in Science and Technology (COST) is a funding organisation for the creation of research networks, called COST Actions. These networks offer an open space for collaboration among scientists across Europe (and beyond) and thereby give impetus to research advancements and innovation.

COST is bottom up, this means that researchers can create a network - based on their own research interests and ideas - by submitting a proposal to the COST Open Call. The proposal can be in any science field. COST Actions are highly interdisciplinary and open. It is possible to join ongoing Actions, which therefore keep expanding over the funding period of four years. They are multi-stakeholder, often involving the private sector, policymakers as well as civil society.

Since 1971, COST receives EU funding under the various research and innovation framework programmes, such as Horizon 2020.

COST funding intends to complement national research funds, as they are exclusively dedicated to cover collaboration activities, such as workshops, conferences, working group meetings, training schools, short-term scientific missions, and dissemination and communication activities. For more information, please go to the Funding section of the COST website (<https://www.cost.eu>).

The COST Association places emphasis on actively involving researchers from less research-intensive COST Countries (Inclusiveness Target Countries, ITC¹). Researchers from Near Neighbour Countries and International Partner Countries can also take part in COST Actions, based on mutual benefit. For more information, please visit the global networking page (<https://www.cost.eu>).



¹Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Macedonia, Hungary, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Turkey

Cost Action CA18203 - Optimizing Design for Inspection (ODIN)

This Action will maximize the full benefit of in service, continuous monitoring of critical aerospace structures by integrating ultrasonic wave based non-destructive evaluation (NDE), energy harvesting and wireless sensor technologies at the design conception phase.

Optimization (of sensors and structures), computational modelling, advanced signal processing and advanced design approaches will be integrated to produce a novel framework, design tools and guidelines for the delivery of the first generation of self-sensing aircraft capable of delivering accurate structural prognosis.

Ultrasound based NDE techniques, energy harvesting and wireless sensor networks are being increasingly demonstrated to be effective in monitoring damage in aerospace components at a laboratory setting.

These components include critical elements such as airframe, engines, landing gear and control surfaces. However, there is an urgent need to integrate these approaches and techniques at the inception of an aircraft. This COST Action will bring together the top European experts across these areas to support the development of an integrated framework for optimized self-sensing structures capable of diagnosis and prognosis, together with demonstrators and educational activities, including training programs, which will ultimately lead to cleaner and safer skies.

General information

Start of Action: 02/10/2019

End of Action: 01/04/2024

MAIN CONTACTS

Cost Action CA18203

Rhys PULLIN
Action Chair
+442920879374
pullinr@cardiff.ac.uk

Runar UNNTHORSSON
Action Vice Chair
+3545254954
runson@hi.is

Petar DIMITROV
Science Communications Coordinator
+38976266263
dipetar@outlook.com

Action website: <https://odin-cost.com/>

Domain website: <https://www.cost.eu/actions/CA18203/>

Action's Working Groups

| | |
|-----------------|--|
| Working group 1 | <p>Design, Optimisation and Integration</p> <p>This group will encompass industrial aerospace design engineers and experts, mathematicians, computer scientists and optimizers with the objective to analyse the requirements for integrating SHM systems at the inception of an aerospace design. A significant challenge for this group is to ensure that specific aerospace requirements are communicated effectively and efficiently to the SHM system designers.</p> |
| Working group 2 | <p>Damage detection</p> <p>This group will focus on the analysis of existing strategies including sensor technologies. They will quantify the capability of systems to identify damage in new structures, power level requirements and compare state of the art signal processing approaches to damage location and characterisation. Finally, the group will deliver a strategy for sharing data and signal processing algorithms.</p> |
| Working group 3 | <p>Power management and energy harvesting</p> <p>Power requirements are a crucial element of this Network. Currently there is a power gap between low power systems and the available energy through current harvesting approaches. Furthermore, there are large disparities between published data and that which is achievable based on methods of testing and analysis. Therefore, this group will seek to develop a detailed understanding of current vibration levels and temperature differences and the location or position they would be found on an aircraft and standard testing procedures to allow a comparison across European research groups. There will be cross work group activities associated with this group.</p> |
| Working group 4 | <p>Wireless Communications</p> <p>Wireless communication is of great importance to unlocking the potential of SHM systems in aerospace, bridge structures and wind turbines. However, the greatest challenge lies in aerospace where there is a restriction in allowable wireless protocols and the complex geometry that signals have to propagate through and around. The working group will focus on aerospace protocols and strategies that will reduce power requirements at a sensor node. In addition, the working group will review the safety and security of existing protocols.</p> |
| Working group 5 | <p>Data management and signal processing</p> <p>This working group will focus on human interface, data interpretation, data presentation, data mining, data efficiency/reduction and hardware integration. There are three tasks associated with this working group. The group will be heavily linked to WG1 and WG2. In addition, there will be strong activities focused on low power processing to reduce power consumption of systems.</p> |

Agenda²

- Workshop: from 14/02/2024 at 09:00 to 15/02/2024 at 17:00
- Management Committee Meeting: from 16/02/2024 at 09:00 to 16/02/2024 at 17:00

| Day 1 - 14.02.2024 | | Day 2 - 15.02.2024 | | Day 3 - 16.02.2024 | |
|---------------------------|----------------------------|---------------------------|----------------|---------------------------|---------------------------------------|
| Time | | Time | | Time | |
| 09:00 - 10:30 | Welcome / First session | 09:00 - 10:30 | Fourth session | 09:00 - 10:30 | Final Management Committee Meeting |
| 10:30 | Coffee break | 10:30 | Coffee break | 10:30 | Coffee break |
| 10:45 - 12:00 | Second session | 10:45 - 12:00 | Fifth session | 10:45 - 12:00 | Final Management Committee Meeting |
| 12:00 - 13:30 | Lunch | 12:00 - 13:30 | Lunch | 12:00 - 13:30 | Lunch |
| 13:30 - 17:00 | Third session | 13:30 - 17:00 | Sixth session | 13:30 - 17:00 | Final Management Committee Meeting |
| | | | | 17:00 | End of the meeting |



²Please note, this is a provisional agenda. A more detailed one will be sent to you as we approach the beginning of the event.

Porto

The city of Porto is bathed by the river Douro and by the Atlantic Ocean. It is an old city, with interesting artistic and social activities, and valuable cultural and historical traditions. It has several attractions, including monuments, museums, concert halls and beautiful sights. The old part of the city is unique and has therefore been considered by UNESCO as World Heritage. Portus Cale is the name of an ancient settlement, where present day Porto and its neighbor Vila Nova de Gaia stand. The name Portugal comes from Portus Cale.

Porto is also known because of Port Wine, produced in the exquisite Douro region. The latter also produces praiseworthy non-fortified wines. A visit to the Port Wine cellars and a cruise along the river Douro are recommended. There are plenty of bars and restaurants where it is possible to try Portuguese wines, local and international cuisine.



Douro Valley: UNESCO World Heritage.

Cost Action CA18203



Links: Porto <https://visitporto.travel/en-GB/> Portugal: www.visitportugal.com

Some city highlights

Walking in the city center, along the old town and the river, and in the sea front should turn a visit to Porto worthy (Figure 4). The best view to the old town is actually from the other side of the river, i.e., from Vila Nova de Gaia. Several elegant bridges, two of them iron bridges, connect the two sides of the river.



Views of Porto

Very worth visiting are [Serralves museum](#) and [Palácio da Bolsa](#). The first displays exhibitions of modern art, including a large Miró collection. The latter is mostly interesting for its architecture and decoration inside. There are a few smaller museums and monuments around the city, and what used to be a wonderful bookshop became a major tourist attraction.



Left to right: Serralves' house, Palácio da Bolsa, Livraria Lello.

Examples of modern architecture are Casa da Música (House of Music) and the Museum of Serralves.



Serralves Museum and Casa de Música.

As often occurs in Portugal, there are several religious buildings, connected to the history of the city. The pictures below indicate three of the most worth visiting. Not far from the Cathedral, it is possible to see part of the remains of the city wall.



Left column: the Cathedral (Sé); middle column: Igreja de S. Francisco; right column: Igreja dos Clérigos.

A word about parks: Serralves Museum is surrounded by a wonderful park, with gardens; Palácio de Cristal park overlooks the river, it is perfect for late afternoon, not bad at all during the day; Parque da Cidade is the largest park of city and stands just next to the sea.

Currency and time zone

Currency: Euro (€).

Time zone in Portugal, mainland: UTC (Western European Time, also known as Greenwich Mean Time).

How to reach Porto

By Plane

Porto is served by an international airport with flights to several destinations.



<https://www.aeroportoporto.pt/en/opo/home>

From the airport to the hotel

- **Taxi:**
Outside the terminal, arrivals floor, the journey to the city center costs around 20 Euro.
- **Metro:**
Line E (Violet) connects Airport Station to the city center and to the metro's network.
- **Bus to the city centre:**
Lines 601, 602 or 3M (night bus).



<https://www.aeroportoporto.pt/en/opo/access-parking/getting-to-and-from-the-airport/public-transportation>

Transportation in Porto

Metro (light rail) and busses serve the airport, the city and the venue. Naturally, regular taxis and Uber are also available.

To use the metro it is necessary to acquire in advance a travel ticket called Andante. It can be bought in some shops and in automatic selling machines, with English menus and available in all metro stations. The Andante is re-usable and re-chargeable. For an ascribed duration and within a certain area, the same trip (charge) is valid in whatever metro line or bus. To use the metro, validate the Andante before entering the train. To go from the airport to most of the hotels, charge Andante with one journey Z4; to go from most hotels to FEUP, charge Andante with one journey Z2.

We recommend using Andante also in busses, just validate upon entering the buss. Alternatively, a ticket can be bought on board; it costs about double the price of a Z2 journey and only works for that particular bus journey. If buying on board, try to have the exact amount with you (2.5 €).



<http://en.metroporto.pt> <https://www.stcp.pt/en/travel/>



Venue

The meeting will be held at Room L 118, first floor of the Department of Mechanical Engineering, Building L, Faculty of Engineering, University of Porto (**FEUP**), Rua Dr. Roberto Frias, s/n (no number), 4200-465 Porto, Portugal.

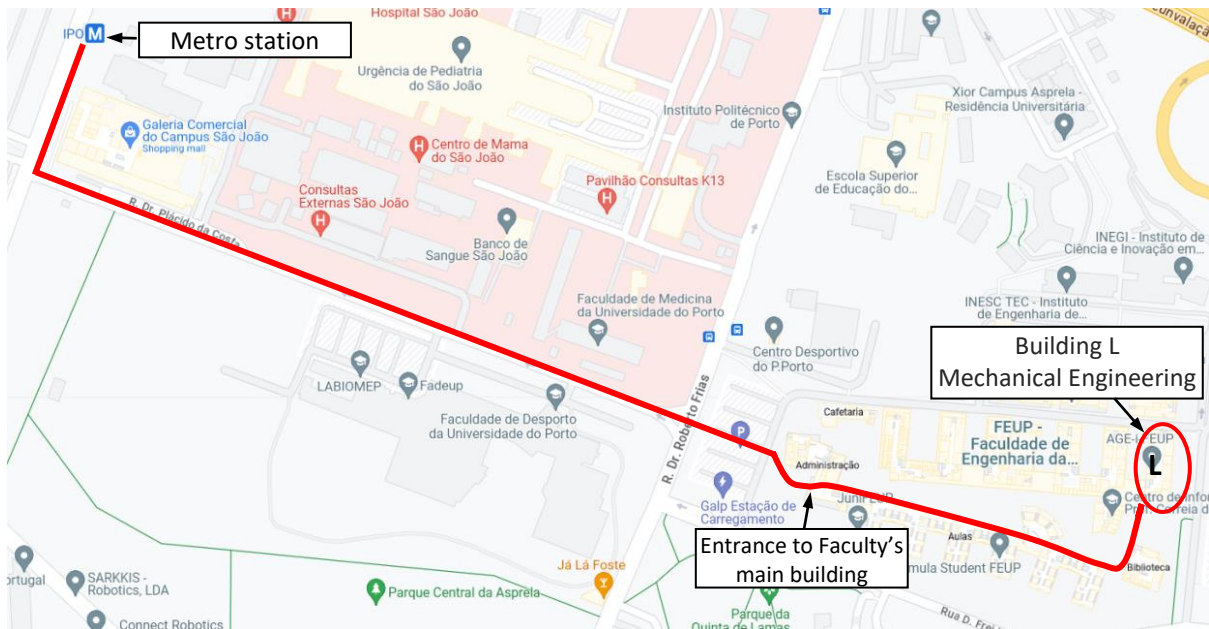
A map is provided below.

How to reach the venue from the city centre

The easiest way to get to FEUP, from the city center, is by using the metro (light rail).

Take line D (yellow line), direction **Hospital de S. João**. The closest station is **IPO**. The red line in the figure below indicates a possible walking path (10-15 minutes) from **IPO** station to the building where the meeting shall occur: short walk from the station to Rua Dr. Plácido da Costa; walk until the end of the latter; cross Rua Dr. Roberto Frias; FEUP is in front of you.

Building L is the last building on campus, just in front of the library (*biblioteca*).



Path from metro station IPO to the Mechanical Engineering department, FEUP.

The Faculty of Engineering of the University of Porto

The University of Porto

The University of Porto, <https://www.up.pt/portal/en/>, "was officially established on 22 March 1911, shortly after the proclamation of the Portuguese Republic. Its historical roots date back to the 18th century when a combination of training experiences would be transformed into a university". It is one of the largest universities in Portugal and one of the most distinguished Portuguese institutions in international academic and scientific rankings. Some numbers about the university are given in the Table below.

| | |
|---------|---|
| 3 | Campuses |
| 14 | Faculties |
| 1 | Business School |
| 48 | R&D Units |
| 18 | Libraries |
| 12 | Museums |
| 315 | Courses (degree awarding) |
| +34 000 | Registered students |
| ~3 600 | Lecturers and Researchers (~2 200 FTE) |
| ~1 700 | Technicians and Administrative Staff (~1,700 FTE) |

The Faculty of Engineering (FEUP)

[FEUP](#), is the largest faculty of the UP (see table below). A successor of the Polytechnic Academy, the Faculty of Engineering of the University of Porto was established in 1915 as the Technical Faculty; the name acquired its current form in 1926.



| | |
|------------------|--|
| 68 | Courses (degree awarding) |
| 7 961 | Students enrolled in degree awarding courses |
| 639 | Lecturers (~415 FTE) |
| Researchers | 147 FTE |
| Research Fellows | 192 |
| ~262 | Non-academic staff |

The faculty's modern complex - which opened in 2000 on Campus 2 - "is an incubator of innovation and knowledge, fostered by the work carried out in the research centres based there, in close contact with the business world and community."



Meals & Refreshments

Refreshments will be served during the meeting according to the program schedule/as agreed.

Accommodation

Porto has numerous options for hotels and accommodation. Feel free to pick the one you find suitable and appropriate.

It is recommended that the accommodation is either at walking distance to the Faculty of Engineering of the University of Porto or near a metro station.

Porto's tourism industry severely expanded in the last decade and it should not be difficult to find accommodation in February.

However, it is wise booking earlier rather than later; a sort of holiday period occurs around Carnival (12 and 13 February).



<https://www.porto-tourism.com/> <https://www.visitportugal.com/en/destinos/porto-e-3203-norte/73735> <https://www.tripadvisor.com/>

ⁱ See included sources.

ⁱ Main Sources

Web sites mentioned in the text; <https://www.wikipedia.org/>; Portuguese proposal for hosting EURODYN in 2014.