

**COST Action CA18120**

**Reliable roadmap for certification of  
bonded primary structures**

**Certbond COST Action Final Conference**

6-8 September 2023

Seville, Spain

**Practical Information Guide  
Technical Programme**

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## 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, ITC<sup>1</sup>). 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/>).

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<sup>1</sup> Albania, 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 CA18120**

With the increasing pressure to meet unprecedented levels of eco-efficiency, aircraft industry aims for superlight structures and towards this aim, composites are replacing the conventional Aluminium. The same trend is being followed by civil, automotive, wind energy, naval and offshore industry, in which the combination (or replacement) of steel with composites can increase the strength-to-weight ratio. However, the joining design is not following this transition. Currently, composites are being assembled using fasteners. This represents a huge weight penalty for composites, since holes cut through the load carrying fibres and destroy the load path.

Adhesive bonding is the most promising joining technology in terms of weight and performance. However, its lack of acceptance is limiting its application to secondary structures, whose failure is not detrimental for the structural safety. In primary (critical-load-bearing) structures, fasteners are always included along bondlines, as “back-up” in case the bond fails. The main reasons for this lack of acceptance are the limited knowledge of their key manufacturing parameters, non-destructive inspection techniques, damage tolerance methodology and reliable diagnosis and prognosis of their structural integrity.

The Action aims to deliver a reliable roadmap for enabling certification of primary bonded composite structures. Despite the motivation being aircraft structures, which is believed to have the most demanding certification, it will directly involve other application fields in which similar needs are required. This Action will tackle the scientific challenges in the different stages of the life-cycle of a bonded structure through the synergy of multi-disciplinary fields and knowledge transfer.

### **General information**

Start of Action: 04/04/2019

End of Action: 30/09/2023

### **Main Contacts**

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Action website: <https://certbond.eu/>

Domain website: <https://www.cost.eu/actions/CA18120>

## Action Management Committee

<b>Action Chair</b>	Sofia TEIXEIRA DE FREITAS
<b>Action Vice Chair</b>	Anastasios P. VASSILOPOULOS
<b>WG 1 - Adhesive and interface chemistry</b>	Ana MARQUES ( <a href="mailto:ana.marques@tecnico.ulisboa.pt">ana.marques@tecnico.ulisboa.pt</a> )
<b>WG 2 - Design phase</b>	Konstantinos TSERPES ( <a href="mailto:kitserpes@upatras.gr">kitserpes@upatras.gr</a> )
<b>WG 3 - Manufacturing phase</b>	Nicolas CUVILLIER ( <a href="mailto:nicolas.cuvillier@safrangroup.com">nicolas.cuvillier@safrangroup.com</a> )
<b>WG 4 - In-service life phase</b>	Wieslaw OSTACHOWICZ ( <a href="mailto:wieslaw@imp.gda.pl">wieslaw@imp.gda.pl</a> )
<b>WG 5 - Disassembly phase</b>	Laurent BERTHE ( <a href="mailto:laurent.berthe@ensam.eu">laurent.berthe@ensam.eu</a> )
<b>WG 6 – Certification</b>	Thomas KRUSE-STRACK ( <a href="mailto:thomas.kruse-strack@airbus.com">thomas.kruse-strack@airbus.com</a> )
<b>Grant Holder Scientific Representative</b>	Sofia TEIXEIRA DE FREITAS ( <a href="mailto:s.teixeiradefreitas@tudelft.nl">s.teixeiradefreitas@tudelft.nl</a> )
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<b>Database Coordinator</b>	Michal BUDZIK ( <a href="mailto:mibu@eng.au.dk">mibu@eng.au.dk</a> )

## Action Working Groups

<p><b>WG 1 - Adhesive and interface chemistry</b>            Leader: Ana MARQUES            Vice-leader: Åsa LUNDEVALL</p> <ul style="list-style-type: none"> <li>• Evaluate current common practice in industry: adhesive chemistries and surface treatment processes for bonded joints.</li> <li>• Collect the requirements and needs of the stakeholders and certification agencies, in terms of regulations (REACH).</li> <li>• Propose novel non-toxic and environmentally friendly surface treatment processes and adhesive chemistries.</li> <li>• Evaluate the quality of the new proposed eco-friendly solutions.</li> </ul>	<p><b>WG 2 - Design phase</b>            Leader: Konstantinos TSERPES            Vice-leader: Norbert BLANCO</p> <ul style="list-style-type: none"> <li>• Explore new design concepts (geometrical configurations and new crack arresting design features).</li> <li>• Compare testing procedures for bondline characterization and models validation (under static, fatigue and impact loading, creep phenomena, imperfect bonding and environmental effects).</li> <li>• Evaluate different design methodologies for the structural behaviour and progressive damage analysis of adhesively bonded structures.</li> </ul>
<p><b>WG 3 - Manufacturing phase</b>            Leader: Nicolas CUVILLIER            Vice-leader: Rūta RIMAŠAUSKIENĖ</p> <ul style="list-style-type: none"> <li>• Specify and select the key-parameters that influence the manufacturing process on an industrial scale.</li> <li>• Evaluate destructive and non-destructive testing for quality control of manufacturing process.</li> <li>• Propose novel embedded sensing solutions for the evaluation of adhesion strength.</li> <li>• Evaluate of the effect of different manufacturing defects on the bondline performance.</li> </ul>	<p><b>WG 4 - In-service life phase</b>            Leader: Wieslaw OSTACHOWICZ            Vice-leader: Theodoros LOUTAS</p> <ul style="list-style-type: none"> <li>• Propose diagnostic tools for the structural integrity assessment of the bonded structure.</li> <li>• Propose prognostic tools for the remaining useful life of the bonded structure.</li> <li>• Develop guidelines towards bonded repairs application.</li> </ul>
<p><b>WG 5 - Disassembly phase</b>            Leader: Laurent BERTHE</p> <ul style="list-style-type: none"> <li>• Description of the state-of-the-art about disassembly technologies.</li> <li>• Evaluation of the technologies and selection of the most promising technology.</li> </ul>	<p><b>WG 6 - Certification</b>            Leader: Thomas KRUSE-STRACK            Vice-leader: Ranko PETKOVIC</p> <ul style="list-style-type: none"> <li>• Define common nomenclature for all WG's activities and deliverables.</li> <li>• Integrate the outcomes and build the roadmap.</li> <li>• Establish contact with relevant certification bodies and large industry manufacturers in naval, civil, offshore, automotive and wind energy and disseminate the progress of the Action and the roadmap.</li> </ul>

## Agenda (Tentative)

Time	Day 1 – 6/9	Day 2 – 7/9	Day 3 – 8/9
Morning	Registration/ Welcome	CertBond Network at a Glance – Part III	CertBond Workshop: Impact and Future – Part I
	CertBond Network at a Glance – Part I		
	Coffee-break	Coffee-break	Coffee-break
	CertBond Network at a Glance – Part II	CertBond Network at a Glance – Part IV	CertBond Workshop: Impact and Future – Part II
Lunch break	Lunch	Lunch	Lunch
Afternoon	Technical Visit	CertBond Network at a Glance – Part V	MC Meeting (14:00 – 15:00)
		Coffee-break	
		CertBond Network at a Glance – Part VI	
Evening		Social Event	

## Detailed Programme I (tentative)

### Day 1 – September 6<sup>th</sup> 2023

<b>09:00 – 09:30</b>	<b>Registration</b>
<b>09:30 – 09:35</b>	<b>Welcome</b> Sofia Teixeira de Freitas, Anastasios Vassilopoulos, Alberto Barroso
<b>09:35 – 09:40</b>	<b>Pitch of the WG3 highlights</b> Nicolas Cuvillier
<b>09:40 – 09:45</b>	<b>Pitch of the WG5 highlights</b> Laurent Berthe
<b>09:45 – 10:00</b>	<i>Continuous fibers reinforced composite structures production using FDM printing technology</i> Tomas Kuncius
<b>10:00 – 10:15</b>	<i>Additive Manufacturing of 3D ceramic-based composite heating elements</i> Alexander Katz-Demyanetz
<b>10:15 – 10:20</b>	<b>Pitch of the WG5 highlights</b> Wieslaw Ostachowicz
<b>10:20 – 10:35</b>	<i>Health diagnosis of polymer 3D-printed plates using the electromechanical impedance method</i> Shishir Kumar Singh
<b>10:35 – 10:50</b>	<i>A comparison of different experimental techniques for crack tip localization in adhesive bonded CFRP-CFRP joints subjected to mode II fatigue loading</i> Michele Carboni
<b>10:50 – 11:15</b>	<b>Coffee-break</b>
<b>11:15 – 11:30</b>	<i>Comprehensive analysis of bonded composite structures using ultrasonic guided waves</i> Kaleeswaran Balasubramaniam
<b>11:30 – 11:45</b>	<i>Could listening to acoustic emissions be a valuable tool in understanding the complex toughening mechanisms of tailored adhesively bonded joints?</i> Rosemere de Araujo Alves Lima
<b>11:45 – 12:00</b>	<i>A practical approach for non-destructive testing of bonded joints to implement an acceptance-promoting in-line quality assurance</i> Christian Gundlach
<b>12:00 – 12:15</b>	<i>Bonded connection of recycled rubber decoupling system in infilled RC frames</i> Marko Marinković
<b>12:15 – 12:20</b>	<b>Pitch of the WG6 highlights</b> Thomas Kruse
<b>12:20 – 12:35</b>	<i>Uncertainty in the assessment of adhesively bonded joints</i> Fabio Santandrea
<b>12:35 – 14:00</b>	<b>Lunch</b>
<b>14:00 – 17:00</b>	<b>Visit to AIRBUS</b>



## Detailed Programme II (tentative)

### Day 2 – September 7<sup>th</sup> 2023 (Morning)

<b>09:30 – 09:35</b>	<b>Pitch of the WG1 highlights</b> Ana Marques
<b>09:35 – 09:50</b>	<i>Surface pre-treatment of aluminum alloy for mechanical improvement of adhesive bonding by maple assisted PLE technique</i> Oana Andreea Brincoveanu
<b>09:50 – 10:05</b>	<i>Mechanical performance of adhesives based on polyols from depolymerization of lignocellulose biomass</i> Alexandra Mocanu
<b>10:05 – 10:20</b>	<i>Microcapsules for eco-inovative adhesives</i> Ana Marques
<b>10:20 – 10:35</b>	<i>Environmental durability of Kevlar composites reinforced with TiO<sub>2</sub> nanoparticles</i> Vera Obradović
<b>10:35 – 10:50</b>	<i>Adhesion of biobased composite repairs</i> Mohamed Amine Tazi
<b>10:50 – 11:15</b>	<b>Coffee-break</b>
<b>11:15 – 11:30</b>	<i>The achievements in self-healing eco-epoxy adhesives for “CertBond” structures</i> Natasa Tomic
<b>11:30 – 11:35</b>	<b>Pitch of the WG2 highlights</b> Norbert Blanco
<b>11:35 – 11:50</b>	<i>Adhesive bonding of Tow Based Discontinuous Composites (TBDC’s)</i> Ioannis Katsivalis
<b>11:50 – 12:05</b>	<i>Experimental tests for material characterization of structural silicone Sikasil® SG-500 for the application of bonded point fixings on glass</i> Eliana Inca Cabrera
<b>12:05 – 12:20</b>	<i>Innovative CFRP composite and Fe-SMA bonded systems for structural glass flexural strengthening</i> José Sena Cruz
<b>12:20 – 12:35</b>	<i>Experimental and numerical analysis of crack growth along patterned interfaces</i> Ping Hu
<b>12:35 – 14:00</b>	<b>Lunch</b>

## Detailed Programme III (tentative)

### Day 2 – September 7<sup>th</sup> 2023 (Afternoon)

14:00 – 14:15	<i>Analytical implementation of the non-conventional failures in cross-ply laminates under fatigue loading</i> Serafin Sánchez Carmona
14:15 – 14:30	<i>Bond behaviour of a stick shape CFRP reinforcement applied according to the NSM-ETS strengthening techniques</i> Luís Luciano Correia
14:30 – 14:45	<i>Multi-physics numerical modelling of EBR CFRP-concrete bonded joints under water immersion exposure</i> Aloys Dushimimana
14:45 – 15:00	<b>Coffee-break</b>
15:00 – 15:15	<i>Machine learning in fatigue life of wind turbine blade adhesives</i> Dharun Vadugappatty Srinivasan
15:15 – 15:30	<i>Assessment of the existing shear strength models for RC beams externally strengthened with FRP</i> Amirhossein Mohammadi
15:30 – 15:45	<i>Snapshots from CertBond and project related ideas</i> Michal Kazimierz Budzik
15:45 – 16:00	<b>Closing session</b>

### Day 2 – September 7<sup>th</sup> 2023 (Evening)

20:00 – 22:00	<i>Social event – dinner</i>
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## Social Event

On the second day of the Certbond Conference (September 7<sup>th</sup>), attendees will have the chance to enjoy a delightful dinner cruise along the Guadalquivir river. This exclusive event offers a remarkable opportunity to network, engage in discussions, and immerse oneself in the rich history of Seville, as the dinner will take place in the heart of this vibrant city. It's important to note that the dinner is not included in the conference package and **requires a separate payment of €29.70 (VAT included) per person.**

To secure your spot for this memorable experience, a GoogleForm will be circulated among the participants to confirm their attendance.



## About Seville

**Seville** is located in the south of Spain and it is the **capital of Andalusia**. With a lot of history behind it, Seville is nowadays a very touristic city. In 1992, coinciding with the 500th anniversary of the discovery of America, Seville held a Universal Exposition in a part of the city known as “Cartuja Island”, a place where today we can find the **School of Engineering of the University of Seville**, which will be the venue for this final Certbond meeting. In fact, the School of Engineering was the “American Pavillion” during the Universal Exposition. The **University of Seville**, founded in 1505, has today **69.800 students** (academic year 21-22) in different campus spread all along the city, only the School of Engineering has almost 6.000 students.



Useful links:

- Seville general info: <https://visitasevilla.es/en/>
- University of Seville: <https://www.us.es/>
- School of Engineering: <https://www.etsi.us.es/>
- Seville’s Airport: <https://www.aena.es/en/sevilla.html>

## Venue

**Place:** School of Engineering (University of Seville) (Classroom 007 - Ground Floor)

**Address:** Camino de los Descubrimientos s/n, 41092 Sevilla (Spain)

**Google Maps:** <https://maps.app.goo.gl/rDia3KYeggFAGYXf9>

**Note:** The School of Engineering has several different entrances, the welcome venue will be in the Ground Floor, classroom 007.

Find a map of the ground floor at: [https://www.etsi-old.us.es/planos\\_etsi/plantabaja](https://www.etsi-old.us.es/planos_etsi/plantabaja)

Local host (contact details): Alberto Barroso ([abc@us.es](mailto:abc@us.es)) mobile phone: +34 657 210 893



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## How to reach Seville

Seville is reasonably well connected with different international airports (Seville Airport code: SVQ).

You can also consider these other alternatives:

- From Madrid: If you have direct connections to Madrid, there is a high speed train (AVE) which takes 2h 30m. Take into account that you need, at least, 1 hour to move from Madrid airport (Barajas), to Madrid railway station (Madrid-Atocha).
- From Málaga: There are also several direct flights to Málaga Airport (AGP), which is 2h 20m by car from Seville.

Seville's airport has only Bus and taxi services to the city center. Airport Special Bus (line EA) (Single ticket: 4 €/Return ticket: 6 €) from Plaza de Armas or cab (between 22,20 and 24,75 € per way depending on date and time). You can find further information of the airport Bus service at: <https://www.aeropuerto-sevilla.com/transportes/autobus-aeropuerto-sevilla.htm>

## How to reach the venue:

- From the Airport: It takes 19 minutes by car, without entering the city center.
- From "Santa Justa" railway station: It takes 15 minutes by car, 27 minutes by bus (C2 line).
- Seville is reasonably small, and a taxi is always a good alternative.
- There is only one metro line which is not useful for the venue.
- From the city center: There are two circular lines which has a stop at the School of Engineering. Both have almost the same route, but one (**line C1**) circulates clockwise and the other (**line C2**) circulates counter-clockwise. Find all local bus information at: <https://www.tussam.es/en>

Venue bus stop name: Juan Bautista Muñoz (Esc. de Ingeniería)



C1 Bus line (clockwise)



C2 Bus line (counter-clockwise)

## Accommodation

Seville is a very touristic city and September is not a high season in the city, so you will have no problem at all in finding a good accommodation at a reasonable price.

The venue (the School of Engineering) is almost outside the city. Although there is a hotel very close to the School of Engineering (★★★★★ Barceló Renacimiento Sevilla), you will be far away (more than 30 minutes) from the city center.

Seville has one of the biggest downtown areas in Europe, so if you arrive by car, be sure to have a parking service at the hotel, because it might be very difficult to find a parking outside.

Some recommendations:

### **NH Sevilla Plaza de Armas (★★★★)**

- 30 minutes walking to venue and close to the city center.
- <https://www.nh-hoteles.es/hotel/nh-sevilla-plaza-de-armas>

### **Exe Sevilla Macarena (★★★★)**

- 28 minutes walking to venue.
- <https://www.eurostarshotels.com/exe-sevilla-macarena.html>

### **Melia Lebreros (★★★★)**

- A good option if arriving by train to Seville. 10 minutes walking from the railway station.
- <https://www.melia.com/es/hoteles/espana/sevilla/melia-lebreros>

### **Hesperia Sevilla (★★★★)**

- More or less the same walking distance (19 minutes) to the railway station, and the city center.
- <https://www.hesperia.com/es/hoteles/espana/sevilla/hotel-hesperia-sevilla>

### **Petit Palace Puerta de Triana (★★★)**

- Close to the city center.
- <https://www.petitpalacepuertadetriana.com/en/>

There are a lot of small and nice hotels at the very downtown with excellent views to the cathedral. It is up to you to find your most convenient location. Do not hesitate to contact the local host (Alberto Barroso Caro - [abc@us.es](mailto:abc@us.es)) to ask for a particular accommodation.

## Meals & coffee breaks

Lunches, drinks and coffee breaks will be provided by the local organiser.

*Note: if you have any restrictions (e.g. any dietary preferences and/or allergies), please contact the local host (Alberto Barroso Caro - [abc@us.es](mailto:abc@us.es)).*



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