

Case Study

1. Project Description: (50 words)

Please provide a short description of your project

The project carried out an assessment of the acoustic performance capabilities of several acoustic barrier designs for airborne Air Source Heat Pump (ASHP) noise control. The assessment was based on both acoustic measurements and simulations based on state-of-the-art methods found in the literature. From the findings, recommendations on barrier placement/design were suggested to the Business Partner.

2. Project Objectives: (200 words)

Please outline the key aim/s of your AKT2I project. Guidance: Include information such as:

- What did the project set out to achieve?
- What was the innovation need you were looking to address?
- What was/is the need that was driving the innovation?
- Why was an AKT2I the right vehicle to address this?
- Summarise what you hoped to gain from this collaboration.

The project provides an understanding of the performance of different noise barrier configurations for minimising noise exposure at a given receiver and also proposes guidelines to assist in the installation of acoustic barriers for ASHP noise control. The innovation was to find an informed approach to optimal acoustic barrier placement, founded on theoretical understanding, which could offer new commercial methods to control ASHP noise in residential environments.

Due to the involvement of ASHPs in the government's "Net-zero by 2050" plans, there is an incentive (both from the government and commercial industries) for an increase in permitted developments. However, certain permitted developments are obstructed by noise regulations (MCS & BS4142). Solutions in the form of acoustic enclosures are available, however, these are aesthetically suited to industrial environments and lack the versatility to control hard-to-reach ASHPs. In such cases, alternative solutions are required to ensure the ongoing success of residential permitted developments.

This AKT2i was a suitable program due to the broad outcome opportunities. As the project was limited to 4 months, this accelerated the opportunity for collaboration should the project be successful. Conversely, the short time duration reduces unnecessary expenditure should the project outcome be less favourable to the business partner.

As an associate, the AKT2i provided valuable experience to practice research in a more professional environment. Having just completed an MSc at the University of Salford, I did not know which specific field of acoustics to pursue. When opting for the AKT2i program, I was interested to learn more about the research industry from a professional perspective and better understand my interests for future positions.

3. Project Overview: (250 Words)

Please describe what the AKT2I partnership did to meet the objectives outlined above. Guidance: Include information such as:

- How did the partnership go about meeting this challenge?
- What activities did the partnership engage in to address the aims of the project?
- What innovation was progressed?
- How did the partnership work together in this process?

Weekly meetings between the knowledge base, business partner and AKT associate ensured that project aims and objectives were clear between all partners. This removed ambiguity and ensured a clear focus throughout, allowing project objectives to be met.

Throughout the project, the associate travelled to the knowledge base to liaise with academic supervisors and meet representatives from the business partner. Additionally, members from all parties were engaged in the acoustic testing procedure at the knowledge base in late February. Throughout the project, there was frequent collaboration between all parties. For example:

1. Discussion on desired commercial objectives between the associate and business partner, either via phone, teams or email.
2. Discussions between the associate and knowledge base on experimental design, either in person, via teams or email
3. Discussions between all parties regarding logistics of material delivery, testing availability, equipment requirements, safety and project objectives occurred regularly during weekly Teams meetings.

Innovation was found through simulation design and acoustic barrier performance characterisation. This led to new suggestions on optimal acoustic barrier placement with specific regard to ASHP installations.

4. Project Outcomes: (400 words)

Please explain what has happened as a result of the activities in which you engaged via your AKT21.

Guidance: Include information such as:

- What did you discover as a result of this partnership (please provide details of all outcomes: a negative result - especially when testing ideas - is as valuable as a positive one, in terms of accelerating decisions)?•
- What opportunities did you identify; and were there any that were not originally anticipated?
- How will those opportunities be realised?
- What solutions were developed via this innovation/how will this innovation be applied?
- What significant impact/s have there been/could there be for the business (commercial/cultural/ environmental/societal) as a result of this project?
- What were the main achievements of the partnership? (Please include any quantifiable impacts)?
- To what extent were the original objectives met?
- Where will the outcomes of this partnership lead?

One of the main findings was the “line-of-site” criteria to establish essential barrier requirements. While somewhat intuitive, having confirmation from simulation and measurement suggests that this result may represent a wider trend, however, additional research is required if this result is to be further understood. It is recommended that future studies seek to characterise the effects of side panels on diffraction by repeating measurements using a greater number of receiver positions. Furthermore, simulations could be repeated using Finite Element / Boundary Element software, allowing for greater control over design choices potentially exposing more interesting results. The knowledge base and business partner have discussed the potential for a full KTP project to be launched which would expand on this preliminary study. Building on these findings would enable the business partner to design ASHP noise control solutions to a much higher standard. This could lead to a more cost-effective barrier installation process for the business partner (and business partner clients), potentially contributing to the 2050 net zero goal by accelerating the deployment of permitted ASHP developments.

Throughout the project collaboration between the business partner and external parties developed. Namely with Rockwool, who provided the testing materials for the project. It is hoped that their already existing business relationship may be strengthened as a result of this AKT. Additionally, acoustic consultancies currently researching ASHP noise control were informed of the project. Their involvement with the Welsh government is seeking to overcome ASHP noise issues and increase deployment. It is hoped that following this AKT, continued discussions between the knowledge base, business partners and external parties may lead to further collaboration.

Several instances of more widespread collaboration, the prospects of publication and the potential for a full KTP between the business partner and knowledge base suggest the project has succeeded in multiple areas. That said, the initial objectives did evolve with the project and were updated/changed to accommodate time and resource availability.

5. Contact Details:

Please provide contact details that we can include in the Case Study for anyone wishing to find out more about the project

Associate Contact:

- James Evans — james.a.e@protonmail.com

Knowledge Base Supervisor Contacts:

- Dr Antonio Torija Martinez — a.j.torijamartinez@salford.ac.uk
- Dr Daniel Wong-McSweeney — d.b.c.wong-mcsweeney@salford.ac.uk

Business Partner Contacts:

- Rick Parsons — rick.parsons@ikoustic.com
- Gabriel Whittle — gabriel@ikoustic.com

6. Quote:

Please provide a quote from the business partner, summarising the value of AKT2I, in the box below

“The Accelerated Knowledge Transfer has been a great project for us at iKoustic Limited. Working with James as our Associate, we have been able to test out some key assumptions regarding noise mitigation solutions for air source heat pumps. We now have a prediction model that we can work on and some robust results that mean we can tailor a solution to anyone’s situation and requirements and predict the outcome with a real level of certainty.”

7. Summarise your project using 3 words:

Noise Control, Air-Source-Heat-Pumps, Guidelines