

## **I like Poland very much and have many reasons to come back here - interview with doctoral student Rasmus Frederiksen**

Rasmus Dønborg Frederiksen, a Dane, has been a guest of the university since the beginning of January. The doctoral student works at Siemens Gamesa (Denmark) as a data processing specialist. At the same time, he is preparing his PhD at the Aalborg University under the supervision of prof. Peter Nielsen. Rasmus Frederiksen's visit concerns a new research thread related to the prediction and planning of preventive maintenance for offshore wind farms.

We talk to PhD student Rasmus Frederiksen about his doctoral studies, renewable energy and his stay in Poland.

### **- What area of research do you deal with in your PhD?**

- I am doing research on damage prediction of offshore wind farm turbines. I have a background in mathematics. I am trying to create a predictive model for wind turbines so that we can assume when possible failures will occur. This is not a new issue, so in my dissertation I am trying to do an analysis of why this knowledge has not yet been put into practice.

### **- What goals have you set for your research?**

- I would like my research to contribute to more efficient wind turbines. This will enable them to produce more energy. This efficiency will make every country greener. I think looking at the topic of renewable energy as a whole will have a significant impact on the efficient and effective operation of wind turbines.

### **- In your doctoral thesis you focus on renewable wind energy. Is this the best solution for obtaining energy?**

- It is one of the key alternatives. Of course, it faces some problems. The wind does not always blow, so energy production is interrupted as a result. However, when considered in economic terms, this type of renewable energy is by far the cheapest solution.

**- Opponents of wind farms often allude to the issues of rising electricity prices and the fact that they spoil the landscape. What do you think about this? Will the disadvantages of wind energy outweigh its advantages?**

- To decide this, wind energy needs to be compared with current alternatives. I believe that all the disadvantages of gas, oil or coal are far greater than the disadvantages of wind energy. The reason wind energy is a topic of discussion is that we are working on something relatively new. We already have some experience with oil and gas, but the disadvantages in all aspects of fossil fuels are far greater.

**- Do we have the conditions to expand wind energy in Poland?**

- Definitely yes. I have already spoken to professors in Poland about this. In the Baltic Sea we see a lot of potential for the offshore industry. There are several places onshore where you can work on bigger projects than we have now. The main thing that is needed is financing.

**- Is Denmark a green country in terms of renewable energy sources?**

- I think we are much greener than other countries. There are times when we produce one hundred per cent of our energy needs solely from renewable energy sources. However, we still need fuels for cars or planes. We are not completely green, but we are definitely one of the leaders in this field.

**- What qualities should a person who wants to become a scientist have?**

- On the academic side, of course one should have critical thinking skills. Such a person should learn what it takes to do research in a particular field. One should also be productive and work hard.

**- What does academic success depend on?**

- For a scientist to be successful, he or she must discover something new. On the industrial side, the biggest success factor in the world is their implementation, because a lot of scientific research only works 'on paper'. When you move into the real world, certain assumptions simply do not work. You have to find the differences between theoretical work and implementation. Therefore, the practical aspect is important. I'm working on a wind turbine topic and I'm from Denmark, which is a very good combination because I can test things and then use them in practice. It will

be more difficult to do this kind of research in a country where you don't have these opportunities.

**- What challenges do you face in the near future?**

- After I have written my doctoral thesis, there will be a project on the implementation of the research in the company where I work. I will think about how exactly we can use the knowledge I have developed in the research results. I hope this will be easier once I have finished my PhD.

**- How do you combine your PhD work with your work at Siemens Gamesa?**

- My research is a project that I would have to do in practice anyway. This research is also something that the company has found interesting and valuable. So the fact that I am doing a PhD and doing research has many advantages for the company itself.

**- Why did you choose the Koszalin University of Technology in particular?**

- I met Professor Zbigniew Banaszak from the Faculty of Computer Science and Electronics thanks to the wife of my thesis supervisor. She highly praised this cooperation and recommended the Koszalin university to me. So I got in touch with prof. Banaszak and we started working together. I came to Koszalin to realise our scientific goals together.

**- Do you see any differences between our universities?**

- The Koszalin University of Technology is very spatially designed and built. In Denmark, we don't have as much space. I also noticed that Koszalin University of Technology has a more hierarchical structure. I didn't get to know many people at the university, but the ones I worked with were very nice.

**- How do you like Poland?**

- I have not yet been to the Baltic Sea but this is not my first stay in Poland. When I was an MA student, I lived in Wrocław for six months. I tried a lot of Polish cuisine then. My favourite dish is pierogi (laughs). I like bigos very much. I like your country very much and I have many reasons to come back here.

The purpose of the doctoral student's visit to the Koszalin University of Technology is to support their research. The university has been cooperating with Aalborg University for many years. Prof.

Grzegorz Bocewicz, PhD., and prof. Zbigniew Banaszak, PhD. from the Faculty of Electronics and Computer Science at the Koszalin University of Technology are working together with prof. Peter Nielsen within the „Operation Research Group”. - So far, we have worked on two research threads. We have developed a declarative mission planning model for BSP flights, taking into account the impact of weather conditions,' explains prof. Grzegorz Bocewicz, 'We have also worked on methods for determining cyclic behaviour in discrete event systems. Mr Frederiksen's visit is already the second of its kind. The previous one was carried out by Amila Thibbotuwawa in 2018 and concerned BSP flight mission planning taking into account the impact of weather conditions.

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