

Final report

1.1 Project details

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| Project title | : Medi Sander Wind |
| Project identification (program abbrev. and file) | J.nr. 64015-0613 |
| Name of the programme which has funded the project | EUDP 2015-II |
| Project managing company/institution (name and address) | IN-Service ApS |
| Project partners | Senex ApS KRN Holding APS |
| CVR (central business register) | 26988438 |
| Date for submission | 15.12.2015 |

1.2 Short description of project objective and results

DANSK

Projektet handler om udviklingen af Medi-Sander Wind. Det er et anlæg til slibning af vindmøllevinger i glasfiber, og det er en løsning, der er stærkt efterspurgt af aktørerne i vindindustrien. Arbejdsopgaven udføres i dag manuelt og normeres typisk til 100-150 timers arbejde pr. vinge. Med Medi-Sander forventer vi at kunne nedbringe slibetiden til ca. 10 timer og derved spare ca. 25.000 i arbejds løn pr. møllevinge – eller DKK 75.000 pr. idriftsat mølle.

Projektet er afsluttet og resultatet er et nyt anlæg, der er i stand til at løse opgaven med slibning af møllevingerne som forventet. Vores indledende mål på 10 timer pr. vinge er nået, og Medi Sander kan slibe en møllevinge signifikant hurtigere end antaget.

ENGELSK

The project is about the development of Medi-Sander Wind, an automated system for sanding wind turbine blades made of fiberglass. Today the sanding is performed manually and the standardized working typically corresponds to 100-150 hours pr. turbine blade. By using Medi-Sander Wind we expect to reduce the sanding time pr. blade to 10 hours, thereby achieving a reduction of wages of app. DKK 25.000, again pr. turbine blade – equals DKK 75.000 pr. turbine.

The project is completed, and the result is a new machine, capable of sanding of the blades as expected. Our 10 hours goal has been reached, and Medi Sander can operate one blade significantly faster than that.

1.3 Executive summary

Our project was initialised by an outline of expectations and demands regarding size, capacity, construction/materials etc. In order to optimize the quality of this process we talked to a number of companies in the blade industry, at already in this early phase, we were confronted with a strong demand. Therefore, we decided to dedicate further resources into the project than we had planned – thus delivering a prototype for tests months earlier than expected.

Our normal production had its normal work flow, and to be able to work consistently on the Medi Sander, we decided to rent a store house for this project alone a few kilometres from our factory.



The cooperation with test partner Klingspor was fruitful from the beginning and as well in idea phase as in construction, Kingsmoor contributed with knowledge and specifications from the blade industry.

Our partner Senex/Blade Treatment unfortunately met financial difficulties early in the project. That caused the company to underperform as a project partner, but fortunately the lack of contribution was outweighed by Klingspor's participation and our own progress. Late 2017 we however found, that Senex/Blade Treatment had to go bankruptcy, and as substitute we brought in technical engineer KRN Holding as formal partner. KRN was familiar with the project, as they had been delivering construction work throughout the project, and in order to finish Medi Sander Wind well, they accepted to step in as partner.

Our prototype has been tested at Siemens Wind Power, and our technical goals has been accomplished regarding a more efficient sanding process. One person can now operate Medi Sander for a few hours compared to weeks of work for people in the production. As a result of these test results Medi Sander is now recognized as an important step forward towards a cheaper and more healthy production environment in the wind industry.

During the second half of 2017 Siemens has ordered their first full scale Medi Sanders, not included in the project economy. Following the deliveries, we expect sales to ramp up during the coming years as we hopefully can continue to show competitive results with the Medi Sander.

Increased demands for documentation was an obvious result of a higher focus upon work environment that followed media coverage from especially the Siemens factory in Aalborg. These demands were implemented in the Medi Sander project, and during the late2017/early2018 we completed the project documentation for future sales, adjustable for the various types of blades.

1.4 Project objectives

The project objective was fairly simple: We wanted to develop a new machine for blade manufacturing aimed at the sanding process. Historically sanding of blades has been carried out manually and this process is not healthy for the operator. Partly due to the fibres and dust, the sanding produces, which is unhealthy for human lungs and partly due to the impact from the handheld sanding equipment.



Raynaud's disease (or phenomenon) is a type of vascular disease characterized by a pale to blue to red sequence of color changes of the digits, most commonly after exposure to cold temperature or shaking equipment such as handheld sanders. Unfortunately, it's a well-known disease in the blade industry, and to protect workers, the industry often limits workers exposure to this process. Therefore, the objective of Medi Sander to a high degree was to eliminate this manual process in the future.

We also wanted to test our invention in among blade producers. The reason for this was to implement criteria stated by future users in the early stage of the development and having a platform for building in experiences of the people who have the manufacturing as their daily work. Klingspor WindPower has a yearlong experience from delivering sanding equipment to the blade producers, and their key focus has been on handheld tools and consumables for surface treatment, especially sanding.

Being the (part) mother company of Senex, our project participant, Klingspor Windpower had a strong incitement to take part in the project as they are confronted with the complications of sanding in a day-to-day basis. They are validated as a trusted supplier in both Siemens and Vestas, securing a strong entry point for our technical test setup.

In the early construction phase, we met with various suppliers of machine equipment such as gear, motors, valves, hydraulics etc. in order to develop our first prototype. Drawings were produced, and our metal workshop started to build the prototype simultaneously. Early in the process we decided to rent a separate factory building app. 1000 m² on Industrivej 35 in Karup. The building was suitable for full scale internal machine tests and assembly for both our project test machine and for future sold equipment.

At our supplier FH Automation, we outlined our criteria for the software. That was implemented in the prototype and in autumn 2016 we were ready to test the Medi Sander at Siemens' blade factory – three months ahead of schedule.



Photo: Media Sander tested

Our prototype was a first generation Medi Sander with a sanding head able to work on a 0-65 degree angle and with a span of operation up to 2200 mm, stabilizing the machine's road along the blade. The sanding head was designed with an efficient exhauster for dust removal and has a pressure capacity up to 200 kg. adjustable for the required sanding purpose.

Both Klingspor Windpower and Siemens Wind Power took part in our tests, and our machine was tested continually for a month, producing valuable feedback for adjustments. In the test phase we also learned about the industry's demands for documentation. Media focus on work conditions in the blade industry forced demands higher, and we needed to allocate more resources than we initially had expected in this area.

Higher demands for documentation was one challenge for the project, that required a higher than expected focus. Another was concerned with our partner Senex, which met financial difficulties and filed for bankruptcy. We were warned about the matter some months before, and we knew that this was the reason why Senex didn't commit to the project as foreseen. Klingspor Windpower stepped in as a volunteer partner in the test field, and in agreement with EUDP, KRN Holding joined the project for participating in adjustments, documentation and dissemination of results.

Having developed Medi Sander in for the original purpose of sanding the blades, our objective for the project has been reached. We are now able to sell machine equipment to the industry for the elimination of manual sanding along the blades, both delivering a more efficient process and a far healthier solution for the operator and for blade manufacturer.

Our preliminary objective of a sanding time of 10 hours pr. blade showed to be conservative, and we have proved the process time to be even faster regardless of blade length or specific requirements.

1.5 Project results and dissemination of results

The project has proved a success for IN Service as well as our partners in the project. We have developed a new machine for the blade industry addressing a serious challenge in the manufacturing of blades. Sanding has traditionally been processed manually, and the manufacturers have paid increasingly higher costs as blades were constructed longer and bigger – and as demands for the sanding has grown still more complex. Our project is not type specific, and as every blade producer meets requirements for surface treatment, we predict market to increase alongside the growing market for wind energy.

Our prototype of Medi Sander is completed, and our tests (and adjustments) with Siemens Wind Power in Aalborg have made us able to take the new product to market, where costumers have already placed orders for purchase.

The dissemination of the project has been carried out as preliminary described with direct presentations towards the industry. As we applied for patent protection we had concerns about presenting the machine too early, but as we moved forward, we were able to present the Medi Sander. During the project period, an increased focus grew upon the health issues from working with blade sanding. At Siemens in Aalborg, the danish governmental department for work health - "Arbejdstilsynet" – found that among health problems in the wind industry, blade sanding provided with the largest part. Not only did an article in Ingeniøren in may 2016 conclude that among 50 % of the health problems came from the blade surface treatment, but they also stated, that it was not only from mechanical reasons. Chemistry in terms of styrene which is used for binding the fibres are not healthy to touch and the air along the blade can easily be contaminated, resulting in poisonous inhalations. This was another strong argument for lowering the amount of manual handling in the blade production – especially in regards of sanding.

Arbejdstilsynet therefore sharpened the restrictions towards the industry's working environment, also forcing the project to increase the focus on the machine documentations in order to make operations with Medi Sander permissible.

Further disseminations are published on the internet at our business partner Klingspor Windpower's homepage (film sequence). We have made an agreement for future sales with Klingspor Windpower, as they already provide sanding material to the wind industry and therefore are likely to use Medi Sander complementary to their own products.

Medi Sander has been demonstrated at some of the world's largest expeditions aimed at the wind industry. That is at the Global Wind Summit in Hamburg in 2017 and 2018 (post project) as well as in the United States at the American Wind Energy's AWEA Windpower events throughout 2017 and 2018.

1.6 Utilization of project results

Utilization of Medi Sander regards commercialisation and further development, as we already see competition in this area. We need to address two main aspects in the future:

- Further adjustments. Standardization towards downscaling components for cost savings in order to meet competition.
- Further developments for remaining best practice. This regards to new developments for controlling the sanding equipment as it regards to the total movement of the machinery along the blade, adjusting sanding pressure when possible.
- Building a world wide sales setup with after sales and service as an added scope.

We have formed partnership with Klingspor Windpower in the marketing process in the years to come. With Klingspor Windpower being a serious part, already delivering sanding material to the wind industry, we find it naturally to join forces. This role was originally aimed at Senex, but as this company went bankrupt, their mother company is a natural replacement. Siemens as well as Vestas are familiar with Klingspor Windpower, and we are confident, that this approach will be of joint benefit as we seek to meet the increasing demand.

1.7 Project conclusion and perspective

Having completed the project in cooperation with our partners and test partners, we have provided the industry with a new and more efficient solution to blade sanding. As we have already sold machines during the last part of the project period, we know, that the demand is strong and persistent.

The idea behind the machine has proven relevant, and although we already have registered some competition in the market, we are confident, that our solution will be successfully implemented in the wind industry in the years to come.

For further development of the Medi Sander, we aim at reducing the production costs and improve operational features such as mobility and accuracy. As the machine has already been commercialized, we assume there will be financial support to take these steps from the accomplished cashflow in the years to come.

