

Q&A with Danny Ellis, Founder and CEO of SkySpecs and their Automated Wind Turbine Blade Inspection System using Drones, Intuitive Software and Web Portal Data Analysis Tool



Danny Ellis
Founder & Chief Executive Officer

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Interview conducted by:
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CEOCFO: *Mr. Ellis, according to the SkySpecs site, you are the only automated inspection solution on the market. Would you tell us about your services?*

Mr. Ellis: SkySpecs has completely automated the inspection of wind turbine blades via the use of a drone, web portal data analysis tool and reporting system. When we work with our customers, we go out to wind farms and launch a drone that flies completely on its own and will inspect all three blades of a tower in fifteen minutes or less. All that data is sent to our portal and then damage is identified, categorized, measured and shared. Recommendations of repairs are sent to our customer.

CEOCFO: *How often are wind turbines inspected? What is industry like to get a sense of where your place can and should be?*

Mr. Ellis: Mostly our customers inspect annually with other on demand inspections that are triggered either from storms or lightning strikes or other environmental factors. Most of our contracts are on an annual basis with our customers to provide an overview of their entire fleet and then in specific use cases where we will come out and do on demand inspections after that.

CEOCFO: *How is it typical inspection done today?*

Mr. Ellis: One of the first things is a lot of our customer are transitioning from a reactive method where they wait for it to fail into something that is condition-based and predictive. If they have been doing inspections, it is usually from the ground where someone will look with binoculars and if they do see something, they will pull out a camera with a zoom lens and take a picture. It is not categorized or usually historically tracked. It is only just tracked until they make the repair.

CEOCFO: *How often are repairs needed, what is the effect when there is a problem and what are going to help happen for the industry and the ultimate users of the wind power?*

Mr. Ellis: Our focus is on increasing the revenue generation potential of the assets and the longevity of the towers. Blades are a significant portion of the power generation. The gear box is what is actually converting the wind to electricity but without the blades, you do not have anything. We are trying to show that by maintaining your blades ahead of time, you are going to increase their efficiency reduce the catastrophic failure rate and take the typical asset life out well beyond 20 or 25 years. Right now, when they are ignoring it, damage on the blade can easily lead to a five percent loss in revenue and that over many years is across the industry, billions of dollars of revenue that is being left on the table. That is the first aspect but it is also working directly with the owners to make sure that their large investment in these assets lasts for dozens of years.

CEOCFO: *Are people interested before you tell them what can be done?*

Mr. Ellis: There are people in the industry that are already being proactive when they see the opportunity, but the vast majority of them have ignored the blades and think as long as it is still spinning, it is working. They are really surprised to

see that their efficiency drops over time are not due to the gear box wearing out but due to the fact that the blades have an increase on drag and they are not spinning as efficient as they could be. There are many people in the industry that are now becoming aware of it but has been in mentality since when they were first installed.

CEOCFO: *How did you come about to develop SkySpecs and the SkySpecs solution?*

Mr. Ellis: I kind of fell into it accidentally. It was originally a master's research project of me and my co founder at the University of Michigan. We were working in our aerospace engineering degrees on autonomous drones and then had an opportunity through the University of Michigan to spin it out into a company and get their support and the local economy support to launch the company. When we did that, we looked out a bunch of industries trying to decide who could use our autonomous drone technology the best. We started pursuing civil infrastructure and other areas first and then we entered a clean energy business competition and when we qualified for the competition was transitioning to trying to inspect wind turbine. We ended up winning the competition and then went off to a wind conference right after that, met a lot of people in the industry and realized there was a real need there and went to build up our whole solution. We got in at the right time and have grown as the wind industry has grown as well.

CEOCFO: *What happens when the drone is looking at the wind turbine and how does it get translated to people that need to know?*

Mr. Ellis: It starts with a regular camera. We are taking still images, so it is a much higher quality than a video stream, and we are usually three to four meters away from the surface, so we are really close up and can get high quality pictures. One top of that, we carry a three dimensional laser scanner that we use to navigate. That is the primary purpose of the sensor but it also gives us the ability to measure what we are looking at. We can correlate the distances and sizes from the laser to the images and now we know exactly where the damage was, how big it is, if it is growing over time. We are also now experimenting with thermal imagery so we can look below the surface the fiber glass to sense de-lamination of carbon fiber or the fiber glass, or if there is water damage below the surface. We are experimenting with other methods, but right now, it is just imagery with laser measurements over the top of it.

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CEOCFO: *Where does cost come into play? Are you able to present in a way that companies understand cost versus potential long range problems?*

Mr. Ellis: Usually inspections in most industries are viewed as a necessary evil. It always comes out of some budget and they are always trying to minimize how much they actually need to repair to get by. The challenge in the beginning going them to say here is a more costly way to do the inspection but you are going to get higher value out of it. We are not the cheapest solution in the market and you can achieve an inspection far cheaper just from taking a picture from the ground but the value you get over time is significantly less. That is what we are pitching to our customers, the value of that data and the higher quality tracking of that data and the analytics that determine optimally when repairs should be done. It is really trying to pitch them on added value, not on checking a box every year that they have done the inspection.

CEOCFO: *How do you get a foot in the door to talk with the appropriate people?*

Mr. Ellis: Everyone is looking for ways to reduce human error in the process, making sure that it is trackable and they can look at historical trends. Everyone is open to it. Most of our feet in the door come from conferences. The wind industry is big on their conferences, there is something going on pretty much every month and everyone in the industry gathers at these conferences and is looking for new ways to optimize and make their entire process more efficient. One of the things in the wind industry that is unique is it was built off government subsidies and those are starting to and have disappeared in some areas. Now businesses that own the wind are looking for ways for it to be a profitable business without help of the government. They are constantly looking for new ways to make those improvements. It is a good time to be in it because you come with a new solution and demonstrate it and a lot of people jump on it right away.

CEOCFO: *Are there potential regulatory agencies that could require an inspection of the type you are able to do or perhaps insurance companies jumping on board as well?*

Mr. Ellis: There are definitely different insurance companies of different requirements. To minimize their risk, they do require some form of inspections. Right now, there are now government regulatory bodies that require this. It is not like a civil infrastructure where human lives are at risk. It is if the owner of the asset wants to optimize the longevity of the tower or not. There are insurances companies getting on board with requiring these types of inspections at least to lower your premium.

CEOCFO: *Might you be able to work with insurance companies?*

Mr. Ellis: Yes it is a big target of ours.

CEOCFO: *Is the wind industry growing?*

Mr. Ellis: Absolutely. The number varies depending on how you look at it but the recent number I saw has grown between 13 and 15 percent annually. Wind is really starting to prove itself. Electricity costs have fallen to be the cheapest of any form of electricity right now and that is really enticing for a lot of people. As they get bigger they are able to generate a lot more electricity for a lot lower operating cost. It is a definitely growing industry. We are seeing a lot of growth off shore in Europe and even a little here bit here in the US but I see a lot of promise for it moving forward.

CEOCFO: *Where can your drones go geographically?*

Mr. Ellis: We are operating throughout North America and Europe. We currently have some opportunities in the South America and Australia, trying to grow those throughout the winter, but do have jobs consistently throughout North America and Europe.

CEOCFO: *Where are the drones physically now and do you just program them to go where needed?*

Mr. Ellis: We deploy them in boxes and they are shipped to the site. An operator that we work with locally will get the box, take it to the farm and deploy it. Each drone only flies for 20 minutes, so they do one inspection and then change the battery and do the next inspection.

CEOCFO: *You make it sound very simple!*

Mr. Ellis: It is, it is one push of a button. I can train anyone in 30 seconds on how to do this. You put it on the ground and push "Go".

CEOCFO: *Who would be launching the drone?*

Mr. Ellis: We usually work with a third party drone operator, largely due to the fact that regulations still require you to have a drone certificate to operate it commercially. Even though it is very simple, legally they still need that paperwork and most of our companies' technicians on site do not have that clearance. We take care of the regulation side for them as well.

CEOCFO: *Is there much maintenance needed on the drone other than changing the battery?*

Mr. Ellis: Not really. We have not really reached to the point where these are wearing out. At some point we might have to change our motors and propellers, but the batteries are the biggest challenge. Lithium polymer batteries have a certain lifespan and we are flying often enough that we are reaching that lifespan in three to six months because they can only charge maybe 2000 times each. We have a revolving door of batteries coming in and out, but that is pretty much the biggest maintenance for us.

CEOCFO: *How did you decide how to price your services?*

Mr. Ellis: For the most part, it is on a job by job basis and it is looking at the size and scope of the job, how efficient we can be and how much added benefit we can bring to the customer. We are not the cheapest solution, so it is not selling value to the customer, but even though we are not the cheapest, we are absolutely the fastest. Some customers will call us and need an inspection done either because the warranty is about to run out or they already have a repair crew schedule and they need a few hundred hours done in a matter of a week or two. I am pretty confident we are the only ones in the world that can actually do that job that fast without deploying dozens of people to do it. We can deploy one person and one drone and get that entire job done. There is definitely value in the speed and turnaround of the data.

CEOCFO: *Are you seeking funding and investment partnerships as you continue to grow?*

Mr. Ellis: We are in the middle of raising our next round of funding right now. We see an opportunity to really scale worldwide and raise the money to do that. We do have a presence in Europe but I want to put a permanent presence there and I want sales operations around the world, so we are in the middle of doing a fund raiser at this moment.

CEOCFO: *What surprised you through the whole process of creating and developing SkySpecs?*

Mr. Ellis: Part of the reason that I do this is that it is never the same day twice. The biggest surprise to me was how large of an effect, as a small, fifteen person company here in Ann Arbor, we could have on a worldwide industry. It did not take us long and we did not even launch our full services until just last April. It did not take us long to have a presence on two continents in four different countries. It is really cool to have such a global affect with our technology we have been working on for so long. It is a great surprise for us that people value our services and technology and we are looking forward to keep expanding that.