Extreme UAV blades inspection

Paolo Brianzoni, CEO of Visual Working SA, talks to PES about the exciting developments in drone inspection. The company is pushing the boundaries to bring the ultimate in image quality and data richness. This means there is the occasional crash, but they just pick themselves up and improve...

PES: Welcome to PES Wind magazine. Thanks for talking with us. Would you like to begin by explaining a little about the background of your organisation and how you currently serve the wind industry?

Paolo Brianzoni: Ciao wind energy enthusiasts! It’s a pleasure to talk with you about drones! Visual Working has been operating UAVs (drones) since 2013 in a wide variety of applications, from TV shows, advertisements and cinema aerial media productions to high altitude alpine dams and wind turbine inspections. Finding the right solution to satisfy our clients’ needs when flying in the most difficult and often extreme environments can prove a real challenge. On a daily basis, we relish the mission of tackling this challenge!

In the wind energy field we have been pioneering UAV Wind Turbine Inspections since 2013, when the first tests performed in the North Sea, using a custom built UAV, resulted in very promising outcomes regarding both efficiency and image quality. The initial goal of inspecting fifteen 44m blades per day was reached during the first inspection season, while, during the 2016
inspection season, we set a new world record with 45 blades inspected in one working day and an average of 10.3 WTG/day over 248 offshore wind turbines.

PES: You are active in a number of industry sectors. How important is the wind business to Visual Working?

PB: We believe that UAV blade inspection is the future and it’s our goal to continuously attempt to improve these inspections, making them safer, quicker and of course, higher quality.

We are currently focused on inspection hardware and methods’ development for our upcoming inspections and I believe the new strategic partnerships we are now establishing as well as the incredible technology advancements we have made, will result in a game changing 360° blade inspection service – All the way from data gathering on the field, to image processing, defect categorisation and reporting.

PES: The use of drones and similar UAV technologies is currently booming in this sector. In such a fast growing sector, are there issues surrounding licensing or qualifications and/or certification?

PB: Absolutely yes, the flight approval process is the biggest headache for any operator of drones. Currently in Europe every country, region or even local town issue their own set of regulations and requirements, one set can often differ greatly from the other and can take a long time to complete. Of course, the associated costs here can be very high indeed.

Considering the undeniable improvements UAVs are bringing to the wind industry (and in many others...) I really hope the much discussed Europe-wide regulation will be published soon. It would be a great shame to drastically limit drone related developments in this industry for any type of ‘bureaucratic’ reasons!

PES: We see that the drones are customised and tailor made. Please could you expand on this and explain the benefits and/or implications in terms of cost and time?

PB: Unfortunately there is no perfect UAV. Honestly speaking, due to the wide variety of environments in which we fly, as well as the hugely varying specifications of our clients, this demands that we are able to

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offer adaptations to the platform/s that will be used for that specific job and/or project. It is the only way to achieve the best result!

Our inspection UAVs are tailor made and setup in order to both fly in harsh conditions, whilst delivering the best possible inspection service. This can mean, withstanding wind gusts up to 70 km/h, or lifting big imaging sensors and heavy optics to get the best image quality, even to carry on-board safety devices to recover the UAV in the event of a crash, are some of the demands made on our platforms.

**PES:** Can you tell us something about the technology by used by Visual Working for inspections? And how you’re helping to limit turbine downtime?

**PB:** Top class imaging sensors & optics combined with a skilled camera operator are the key factors in achieving the best image quality. While powerful, fully redundant UAVs operated by experienced pilots focus on keeping the drone in the air.

We are currently testing and can’t wait to use fully autonomous inspection UAVs in the field, which will give us dramatic improvements in terms of inspection consistency along with a reduction in manpower requirements.

But it’s still a secret!

**PES:** What quality of image do you capture, what equipment do you use and why?

**PB:** We have different options in regards to image quality. Past inspections were performed with a 22MP sensor and new platforms will be equipped with sensors up to 51MP, a 130% improvement in image resolution!

The finest optics are combined with these powerful sensors, in an attempt to ensure that the smallest detail is captured, and indeed, ultimately enhanced by a proprietary, ‘ad- hoc’, image post processing software.

**PES:** Is your work weather dependent, what sort of climates are you able to work in?

**PB:** Our work can be weather dependent to a certain point, but I think more in the cases of “extreme weather”.

In the past years we’ve flown in conditions that include: wind gusts up to 20m/s, 3 meter waves, -15°C temperatures, fog, snow etc....

We continually strive to be less weather dependent than we were before in order to reduce weather downtime and therefore inspection costs.

If remote control on the turbine is possible, we are already able to perform inspections even when weather conditions don’t allow transfers to the turbines themselves, since we operate our drones directly from the vessels.

**PES:** Geographically speaking, where are the key wind markets for you?

**PB:** Currently our main countries of operation include Belgium, The Netherlands and Denmark. We are also in contact with clients in many other countries and can’t wait to expand our marketplace worldwide! This is another exciting challenge.

**PES:** What are your thoughts about prospects for 2017 with regard to your organisation, and the wind industry in general?
PB: 2017 will be the year that the wind industry fully recognizes the advantages of these inspection methods and we are already experiencing a significant increase in interest for our inspection services.

PES: And conversely, what presents you with the biggest challenges?

PB: UAV wind turbine inspection presents many challenges, both of a technical and operational nature. Drone technology is developing at an astounding pace, new systems and sensors combined with ever evolving computer vision software and state of the art algorithms open the door to, until a few months ago, futuristic possibilities such as fully autonomous inspections along with never before seen-performance & quality.

Keeping up with this frenetic pace obviously requires huge amounts of R&D work, code writing, non-stop testing and… occasional crashing.

Scaling up to satisfy the fast growing market demand requires lots of resources too. Besides substantial equipment investments it can also be really difficult to find and train pilots, operators and assistants who have the appropriate skills and mind-set to operate with the highest precision and focus in such extreme environments.

I will leave it there for now. I hope you agree, it looks like exciting times ahead in our industry – so please come and see us, either in Hamburg at the WindEnergy 2016 or in Amsterdam – we would love to talk more.

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