



Hrafinkel SARL

Hrafinkel SARL is a limited liability company seated at Pressigny, Eastern France, founded in April 1999.



Since 1992 experienced in structural engineering, site prospection, wind monitoring, power production estimates, wind farm engineering, SCADA data analysis, due diligence, ...

The company covers today:

- (i) Conception and design of wind monitoring stations
- (ii) Classic and sonic anemometry
- (iii) SODAR / LiDAR anemometry
- (iv) Chiroptera measuring stations
- (v) Power production estimates, due diligence
- (vi) Windfarm development





Équipe

- 1 mechanical engineer Dipl.-Ing., M.Sc.
- 1 biologist/geologist Dipl.-Geo-Oek.
- 1 macro-economist Dipl.-Volksw.
- 1 technician
- vocational education and graduate internship



Services and Products

- Turn-key execution and operation of wind monitoring stations, mast-based and/or profiler, telemetric acquisition, analysis and archiving of data
- Fluid dynamic site models, orography and roughness descriptions
- Power production estimates for financing and due diligence
- SCADA analysis, power-curve compliance
- Conception, design, analysis to Eurocode, manufacturing of masts
- Design, manufacturing of data acquisition systems for micro-meteorology
- Supervised learning of linear classifiers for climate anomaly correction and seasonal decomposition of LiDAR and SODAR observations
- Site prospection, initiation & development of wind farms
- Visualisations

Techniques and Tools



Power Production Estimates and Wind Farm Planning

- WAsP ©
- WAsP engineering ©
- WindPRO ©
- ElipSys3d (CFD RANS)
- PPE uncertainty analysis, Monte-Carlo and ISO/GUM Method

Data Acquisition and Processing

- Cup anemometry
- Profiler anemometry (SODAR, LIDAR)
- Sonic anemometry
- Data base development
- DB quering
- Finite Elements for elasto-mechanic analysis
- Algorithms for power production estimates
- Re-sampling and bootstrapping (R environment)

Hardware

- 4-WD vehicle, flatbed trailers
- Rope tackles, mast rigging tools
- Theodolite and GPS
- Independent power supply
- Cup and sonic anemometers
- Cable guyed masts
- Acoustic wind profiler, SODAR
- 2 Laser-optic wind profiler LIDAR
- PSE, rope access gear
- Laboratory wind tunnel
- Photogrammetric equipment





Activities

Wind measurement campaigns

- Wind measurement campaigns with met masts, SODAR, LIDAR

Power production estimates

- Due diligence (energy production & operation) for over 1000 MW (buyers' engineer)
- Site assessment, > 600 MW
- Full power production estimates, > 500 MW

Chiroptera measurement stations

- Measurements by masts, lift for ultrasonic recorders (batcorder, SM4BAT, ...)

Wind project development

- Planning and land securing
- Coordination with municipalities/administration
- Visualisation
- Acoustic impact, shadow flicker

Subsidiaries and participation

- SAS Tincey-et-Pontrebeau, Haute-Saône, France
- Joint-ventures 'Kinopraxia Aiolikou Strimonoxoriou', 'Xortero', 'Ammoudia', Greece
- Subsidiary at Serres, Greece
- Represented in Ukraine by ZTE PROEKT

Wind power in France, since 2000

- Prospection of potential wind farm sites > 930 MW
- Contribution to building permit applications > 130 MW
- 20 MW building application procedure
- 7 MW under development

Wind power in Greece, since 2003

- More than 15 wind monitoring campaigns
- Prospection of wind farm sites totalling 400 MW
- Obtained production licences : 62,1 MW
- Obtained environmental licences: 34,5 MW

Wind power in Poland, since 2007

- Windmonitoring, profiler
- Power production estimates
- Technical Due Diligence

Wind power in Ukraine, since 2010

- Site prospection
- Potentiel measuring
- Power production estimates
- Assistance in negotiations
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Wind power in Finland, since 2012

- Technical Due Diligence
- Power production estimates





Application research

- SODAR anemometry, in collaboration with DTU (today Risø-DTU, Denmark)
- Seasonal decomposition of profiler observations by supervised learning of a linear classifier
- Cup anemometry : spatial and temporal averages of wind speed; influence on power curve profiler/anemometer deviation
- Higher order anemometry

Micrometeorology

- DLR / Airbus / METEK on the Airbus A350 XWB prototype: minor contribution to the background measurements during the vortex wake measurement campaign (involved LIDAR, SODAR-RASS and sonic)
- Vertical wind profile: reversal height, a scale characteristics of the boundary layer?

Turbulence

- Turbulence emission
- Structure of turbulence : ongoing development of a wind odometry instrument package following the proposal of Leif Kristensen



Rope access

- 2 certified persons for rope access

Wind turbine O&M

- Inspection of wind turbines as part of Due Diligence



Visualisations of wind farms



- Realisation of visualisations (building permit applications for wind farms)
- WindPRO VISUAL
- Choosing and carrying out shots
- Maps showing the location of viewpoints, their angle and orientation
- Transects





References

- Airbus Industries
- Biotope
- CGN Europe Energy
- Compagnie Nationale du Rhône
- DONG Energy A/S (today Ørstedt)
- Egrega
- Energieteam
- H2air
- IQONY (formerly STEAG)
- KJM Conseil Environnement
- KS Umweltgutachten
- METEK GmbH
- Opale Velocitas Energies
- Ostwind (today Ørsted)
- Renerco AG (today BayWa)
- RWE/Harpen AG
- SEM EnR Citoyenne
- SEM SEVE
- UNITE





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S.A.R.L. with capital of 7.622 €

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