



Fulcrum3D

WIND SOLAR FUTURES

Fulcrum3D Sodar

International Supply & Support - Oman





Who are we?

Midan Muscat International Services LLC (MMIS) is representing Fulcrum3D in the Middle East as reseller and support for the Fulcrum3D Sodar and other meteorological monitoring solutions. Fulcrum3D have been supplying resource monitoring solutions globally for the renewable energy industry for over a decade and MMIS is perfectly placed to support the high standards we have to supply and support our products in the Middle East.

Company Profile – Fulcrum3D

Fulcrum3D are a Sydney based technology company focused on the renewable energy sector, with a strong background in wind and solar. The team at Fulcrum3D has decades of experience in the Renewable Energy Sector and environmental instrumentation in particular, both in Australia and overseas. This team includes chemical, renewable energy, mechanical and electrical engineers along with WHS professionals, physicists and data scientists.

Fulcrum3D's flagship Sodar wind monitoring system is one of only five remote sensing instruments globally considered to provide bankable wind data by leading independent consultants such as DNV-GL. Development of the Fulcrum3D Sodar resulted in a robust telemetry platform and associated web access portal *FlightDECK*, where clients can download data in near real-time. This technology resulted in the development of our own Fulcrum3D DataVOLT logger.

Fulcrum3D takes pride in the ability to offer clients holistic monitoring solutions from system design, integration and installation, through to data management and subsequent analysis. Fulcrum3D regularly works with lenders' engineers and developers in the wind and solar sectors to generate bankable analysis and understands the required tractability and confidentiality.

Company Profile – MMIS

MMIS is a management and investment company that provides a number of specialised services in the Gulf Cooperation Council (GCC) countries. MMIS is based in the Sultanate of Oman. Through its long standing working relationships within the Sultanate, MMIS has developed a solid network of businesses within the growing renewable energy industry. It is based on these contacts that MMIS is proud to have been appointed the sole reseller for Fulcrum3D within Oman.

Capability Statement

Fulcrum3D's Sodar and meteorological monitoring systems have been installed and remain in operation around the world. We provide high quality and accurate data through our systems, which have proven to be robust and reliable in even the harshest of environments.

Outside Australia the Fulcrum3D Sodar has been delivered and operates in the following countries –

- ▶ Asia – China, Mongolia, Philippines, Saudi Arabia, India and Japan
- ▶ Europe – Spain, Germany, Holland, UK, Romania and France
- ▶ America – United States, Argentina, Suriname and Hawaii

Our service is much more than just the provision of hardware – as a team we take an interest in our clients' individual needs, providing experienced responses to queries in a timely manner.



Figure 1: Factory acceptance testing completed on the new China Sodar design

High-quality, cost-effective wind monitoring solution

Our Production & Service Philosophy

Fulcrum3D not only provide a high-quality remote sensing device that is widely used in Australia by some of the largest developers operating here, but we also back this up with a commitment to providing the best service throughout operation.

There are currently over 250 Fulcrum3D Sodars worldwide. All of our Sodars are manufactured and assembled here in Sydney where we can ensure the processes involved are completed to the high standards we demand. Final assembly of all major components is completed in our factory in Artarmon, NSW. Our systems then all go through a strict factory acceptance test before being distributed across the country and further afield.



Figure 2: Fulcrum3D office and factory space in Artarmon, NSW

Advantages of the Fulcrum3D Sodar include –

- ▶ Improved, high performance, particularly at higher heights up to 200m
- ▶ Short lead time
- ▶ Cost-effective wind and solar measurements for multiple locations
- ▶ Easy to deploy, install and relocate
- ▶ Reliability – manufactured from long-lasting materials for harsh environments
- ▶ Largely maintenance free for >6 years
- ▶ Modular design means that on the rare occasion maintenance is required all items can be swapped in the field
- ▶ Can be fitted with additional met and solar instrumentation
- ▶ Standard remote comms and standalone power kits
- ▶ Easy access to raw and processed data
- ▶ Readily available support from the Fulcrum3D team of engineers and scientists

Whereas some other Sodars are winding back production, the market continues to grow for Fulcrum3D. We also continue to develop our Sodar and look for improvements, evidenced by our use of the Sodar in our wind forecasting projects.

Quick, Simple International Delivery

Our manufacturing lead time is typically <6 weeks on all brand new Sodars. At Fulcrum3D we are continuing to develop our international presence, regularly airfreighting our Sodar overseas. Our rapid production is aided by our ability to ship anywhere in the world quickly, substantially reducing lead times.



Figure 3: Fulcrum3D Sodar being packaged for international airfreight



Figure 4: International grade ISPM 15 stamped plywood casing

The Sodar is packaged locally with high, quality export grade packaging before being delivered to the airport for international freight (see Figure 3 and Figure 4). Our dimensions allow for freight through commercial passenger flights allowing fast, economic deployment globally. This ensures that delivery to most destinations in Asia takes less than 2 days. The care taken with our packaging and documentation safeguards against delays in customs so that our clients receive their Sodar as quickly as possible.

Easy Installation Options

Fulcrum3D can mobilise from Sydney, Australia and collect the Sodar or meteorological station from the delivery point. We then tow the Sodar to the monitoring location and commission the unit. All of the Fulcrum3D technicians and engineers who collect and install the Fulcrum3D systems have completed >1 year assembly and manufacturing in our factory.

Alternatively, Fulcrum3D can provide on the ground training so that our clients have the flexibility to commission and relocate our Sodar at their convenience in the future. During all works carried out by our clients Fulcrum3D will provide remote support 24/7.



Figure 5: Three Fulcrum3D Sodars departing the factory for Western Australia



Figure 6: Accessing hard-to-reach monitoring locations is not a problem

Between procurement and delivery, Fulcrum3D work with our clients to ensure that all access and installation factors have been considered. We will provide advice on monitoring locations as required. Our Sodar can be installed in a trailer or otherwise delivered to site on a truck and levelled from the solid steel frame.



Figure 7: A remote monitoring location in the often-challenging NSW country



Figure 8: Two Fulcrum3D Sodars delivered to laydown area of construction site in South Australia

Data Monitoring & Management

Our fleet of wind and solar monitoring stations gather and store raw data locally. We also retrieve, securely store and make this data available through our online portal, *FlightDECK*. Our clients can have as many *FlightDECK* users as they want, who can log in to the easy-to-use portal and see monitoring location, instrument and campaign histories, and download data.

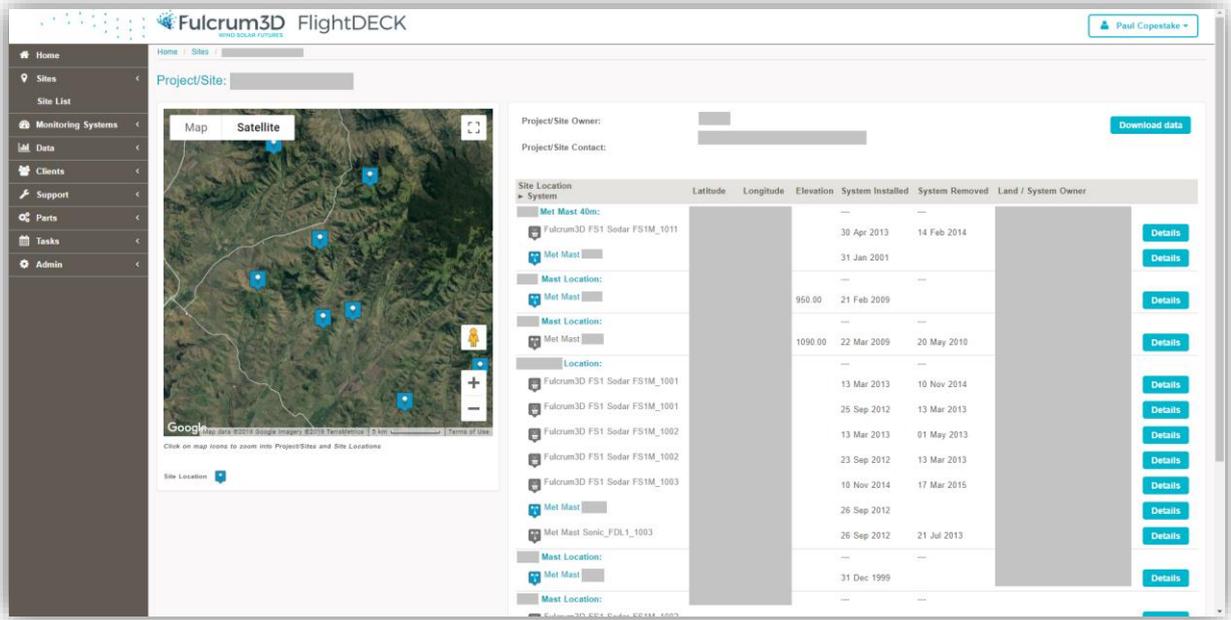


Figure 9: FlightDECK – Fulcrum3D Sodar and Met Mast Monitoring across a project



Figure 10: FlightDECK – Processed wind speed and direction time series in FlightDECK

FlightDECK performs a number of standard checks, providing alarms to our engineers and clients. Alarms include –

- ▶ Communication status – time since last data retrieval
- ▶ Power / battery status – connected to power, is battery charging, maintaining required voltage
- ▶ Instrument status – data received for time period, within appropriate boundaries etc

The raw data *FlightDECK* processes is then available in the form of a .csv. The data is secured onsite and offsite with a third backup onboard the unit itself.

Fulcrum3D can also push the data to a client server of choice, in order to streamline the data management and analysis process for your engineers.

Fulcrum3D Sodars Operating Around the World

Fulcrum3D treat all information regarding monitoring sites in the strictest of confidence. Care has been taken below and elsewhere in this proposal to ensure that no confidential details are presented.

Standard configuration of the Fulcrum3D Sodar comprises of power and comms kits. Optional extras are shown below including acoustic baffles, fencing and solar monitoring.



Figure 11: Fulcrum3D Sodar operating in harsh environments in China



Figure 12: Heavily forested monitoring location in Scotland, UK, complete with acoustic protection baffles



Figure 13: Fulcrum3D Sodar commissioned in Japan



Figure 14: Snow covered Sodar in Tasmania



Figure 15: Solar monitoring kit - two Kipp & Zonen pyranometers



Figure 16: Satellite modem and antenna fitted for extremely remote monitoring in QLD



Figure 17: Fulcrum3D Sodar installation in Mongolia



Figure 18: Installation near tall mast in India