

## Bridge to the future: How WindCube Scan enables the most ambitious bridge ever built



### **The challenge:** Obtain coherent wind data to validate new bridge designs

Kjeller is an early adopter of wind lidar in the Nordics, with a decade of experience using Vaisala WindCube® technologies. For this project, they have had to do something neither they nor anyone else has ever done: provide accurate wind data to enable record-setting bridge designs spanning the Halsafjord and Sulafjorden crossings.

Traditional met mast installation was not feasible: For each bridge site, two met masts would be required in a fjord 3km wide, with water depths reaching 550m. Furthermore, wind profiles must be measured at different points along the proposed bridge routes to create sufficient turbulence and differential wind load information. The only suitable technology to provide this data is scanning lidar.

### **The solution:** Design a long-term wind campaign for full 3D wind profiles of bridge areas

Kjeller, in partnership with the Technical University of Denmark (DTU), the University of Stavanger, and Vaisala, set out to collect detailed wind data in several proposed bridge areas for a campaign length of at least 5 years. A lengthy campaign is needed to capture a sufficient sample size of extreme weather events, since those are what make bridges most vulnerable. At the end, designers will know how they need to structure the bridges to survive and serve motorists for years to come.

Kjeller deployed four WindCube Scan lidar units to measure the wind at various points in midair, all along the planned bridge structures. Measurement points were easily within the WindCube Scan's 10km range.

### **The client:**

Kjeller Vindteknikk

### **Industry:**

Meteorology,  
transportation

### **Vaisala provided:**

WindCube Scan 400S

### **Project setup**

- Sites: Halsafjorden and Sulafjorden crossings along Norway's E39 coastal route
- Four WindCube Scan 400S lidar units, two on each side of the water
- Campaign length: 2 years completed in a 5-year campaign

**The benefits:  
Detailed wind assessment,  
validation of ambitious  
bridge designs**

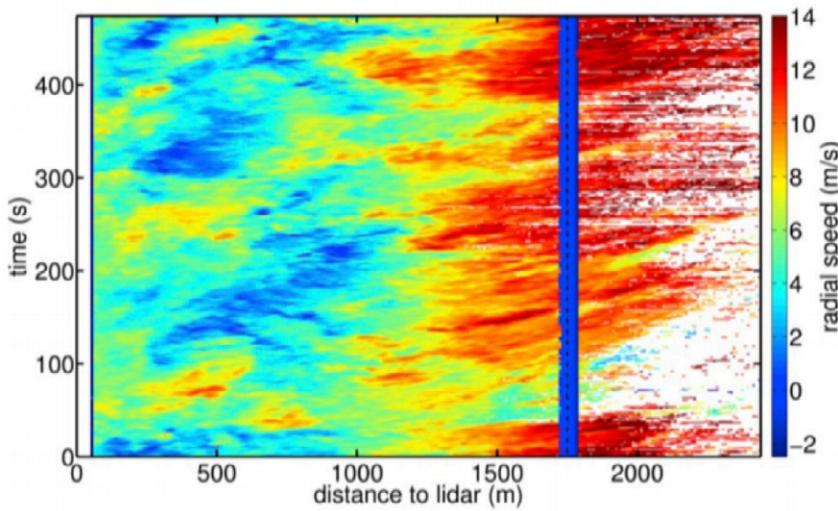
WindCube Scan made an accurate, highly detailed wind measurement campaign possible in a location where traditional methods would not have worked. Collecting data safely and cost-efficiently from the shore, the lidar units continue to provide high-resolution information over areas that would be inaccessible using other means.

The measurement campaign continues, but a large amount of data has been captured, and this will eventually be combined with historical weather data to give bridge designers the ideal starting point.

Thanks to WindCube Scan, Kjeller and Norwegian authorities are well-positioned to deliver safe, reliable bridge designs in one of the most challenging Nordic environments.

*“If you are going to build a 100m-long bridge, you can just pick up the handbook and design it. But when the bridge is 2 or 3km long, there is no book chapter for that. You need very complete, accurate measurement.”*

*Lars Tallhaug  
Head of Department  
Kjeller Vindteknikk*



**Knowing the winds**

WindCube Scan produces spatial wind data at configurable distances and with multiple scanning pattern choices. Data samples like this one provide crucial decision-making information for a wide range of applications.

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