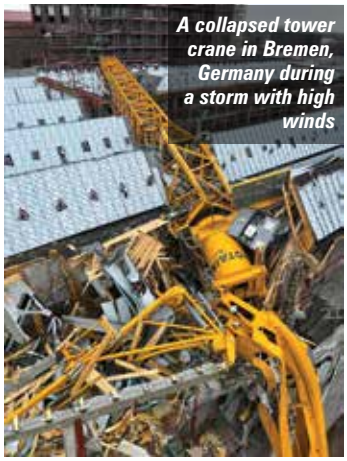
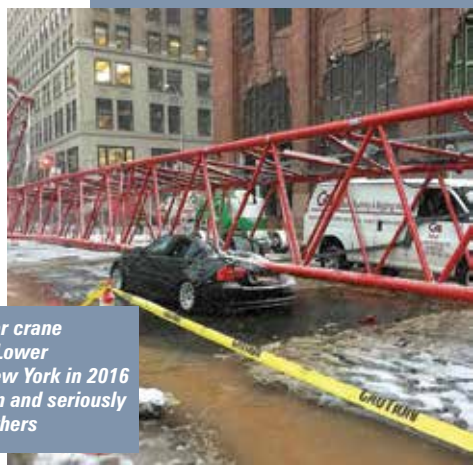
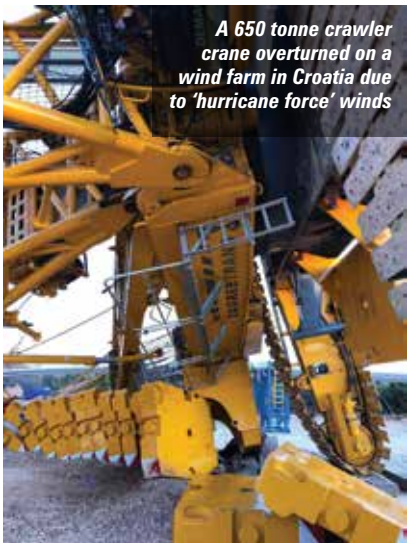

A collapsed tower crane in Bremen, Germany during a storm with high winds


A large crawler crane overturned in Lower Manhattan, New York in 2016 killing one man and seriously injuring two others



# REDUCING WEATHER DOWN TIME COSTS?


A 650 tonne crawler crane overturned on a wind farm in Croatia due to 'hurricane force' winds

**The weather, and in particular high winds, can be highly disruptive to construction projects and pose risks to cranes and access equipment - particularly mastclimbers, hoists and scaffolding - all of which can lead to work stoppages, site closures and the postponement of specific jobs. Rental companies can find that contracts they had scheduled are cancelled at the last minute due to online forecasts, which can turn out to be false alarms disrupting work without need.**

**Confidence in weather reporting plays a crucial role in the scheduling and success of an outdoor project. Accurate forecasts allow managers to plan work efficiently and minimise weather related disruptions, enabling major lifts, work at height, concrete pouring and roofing work to be scheduled during favourable conditions, and alert them to bring long booms and jibs down, or fold self-erecting tower cranes before it becomes too wild to do so, thus reducing risks of accidents and damage.**

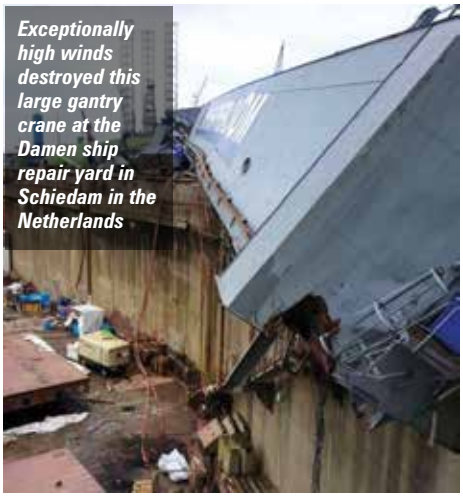
Conversely, inaccurate forecasts can lead to premature shutdowns or unexpected weather events, causing delays and increased costs. Automated alerts and predictive analytics targeting local areas can really enhance decision making, ensuring that project managers can adapt quickly to changing conditions, maintaining safety and productivity.

Confidence in traditional weather forecasts is low because they are all too often inaccurate, at least at a local level. Weather systems are inherently chaotic, meaning even slight variations in conditions can dramatically alter the outcome. Forecasters have enough difficulty attaining accurate generic forecasts, let alone trying to predict what will happen at a specific location such as a construction site, and cannot account for site-specific influences like topography. This leads to further inaccuracies with predictions compared to observations, especially with wind.

Yes, there are numerous weather forecasts available on the television, radio and even Apps, however while they may be reasonably accurate for a day or two, they are never precise enough when planning major infrastructure projects such as an intercity rail link or a nuclear power station. Delays due to the weather can result in massive cost and time implications.

## PREDICTION GAMECHANGER

One company that has the statistics to back up its claims of being able to predict the weather better than anyone else is UK based MetSwift. The company has three main products including the only predictive weather model for one to 24 months ahead, and its recently launched HLP - Hyper-local Precision model - with onsite recording which dramatically increases accuracy for its one to 10 day forecasts. MetSwift claims that its proprietary weather models outperform existing solutions in more than 70 percent of scenarios and that in a four year study of major cities across the world, MetSwift gave a more accurate 90 day forecast than AccuWeather for 91 percent of locations.


Exceptionally high winds destroyed this large gantry crane at the Damen ship repair yard in Schiedam in the Netherlands

## BUT WHY DOES ACCURATE WEATHER FORECASTING MATTER?

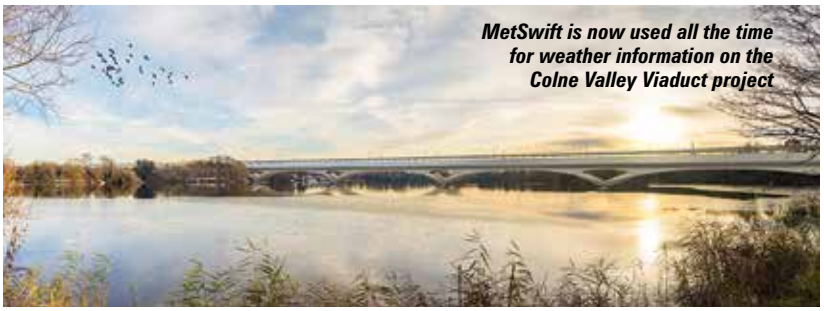
As we have already touched on, weather delays can significantly increase project costs due to additional labour expenses, extended equipment rentals, increased overhead costs, not to mention potentially huge penalties for missed deadlines. Depending on the type of project, estimates range from a few percent to as much as 30 percent of the total project cost, depending on the severity and duration of the weather events during the project. Conversely, there are big savings to be made from less downtime by having a more accurate forecast for your site or area.

Depending on the agreement, the contractor may be obliged to mitigate the impact of delays due to the weather and may include changing the order in which the works are carried out or speeding up the programme of works when the weather abates.

If more accurate weather forecasting is available, it allows it to postpone or reschedule work in advance of a predicted bad weather event. Major infrastructure projects that are, for example, heavily dependent on crane lifts need to know in advance when the probability of high winds are likely to occur so as to plan accordingly.

One contractor already using MetSwift is the Align Joint Venture carrying out the Colne Valley Viaduct stretch of the HS2 railway in West

*The Align Joint Venture - carrying out the Colne Valley Viaduct stretch of the HS2 railway in West London - is using MetSwift to plan its activities more efficiently*



*MetSwift is now used all the time for weather information on the Colne Valley Viaduct project*

London. When completed the bridge will be 3.4km long with an overall weight of 116,000 tonnes making it the largest railway bridge in the UK and one of the largest single civil engineering works.

"The precision of MetSwift's weather forecasts allows us to plan activities more efficiently, avoiding weather-related delays and disruptions," said lifting manager David Hall. "This accuracy has translated into tangible cost reductions by minimising downtime and optimising resource allocation. Our investment in MetSwift is invaluable."

## GAINING CONFIDENCE

"For the first six months of working on the Colne Valley Viaduct section those involved used XC Weather and not our forecasts because as we were new, no one wanted to trust it," says Tim Ryan of MetSwift. "However, if you speak to Dave Hall today he is 100 percent behind us. For example, if it is a Monday planning meeting and MetSwift says the weather is good to do a crane lift on Thursday, he will proceed based on our forecast even if XC Weather says it will not be possible. It has taken time to prove ourselves, but we are much more accurate than anything else in the market. This is because of the better data collection analysis and on the HS2 viaduct, the weather stations set up along the length of the project giving us daily localised data."

## IN THE BEGINNING…

In the early days MetSwift had no data on how accurate its predictions were, so it started recording and comparing them against two other weather programmes - XC Weather and the Global Forecasting System (GFS) provided by the NOAA American Met Office - to see which was more accurate and how they differed.

"For operational gust speeds over the past six months we were the most correct 100 percent of the time," says Ryan. "For general wind speed, we were correct 70 to 80 percent of the time."

"We are competing against freely available Apps, so our main hurdle is convincing a new client that we are not only much more accurate but that the system is worth paying for and therefore cost effective. Once they see how much more accurate we are they feel confident to plan for work over the following week based on our forecasts. On long term projects, say over five years, if we save them one hour of downtime a week then the system pays for itself, yet we have figures to prove we can save them much more than that per week. Of course, we can get it wrong, but we get it right far more than any other systems and clients can see quickly see the savings."

## METSWIFT PRODUCTS

MetSwift has three main products - Advanced Long-Range (ALR), the recently launched Hyper-Local Precision (HLP) and MetSwift Reports. As the name suggests ALR is a long range, one to 24 month weather model which predicts the risk of downtime and is the only company that offers this, as current long range predictions only go out three months. Predicted conditions globally can be seen so that clients can understand risks according to their parameters. It is powered by Claros - a proprietary model that uses a meteorological technology, a vast library of historic data and cutting edge data science.

"Over the last few years, we have been working alongside various construction companies - particularly Sir Robert McAlpine - to provide estimated downtime reports for projects at various stages," says Ryan. "In some cases, these are projects already underway in need of new data to help get themselves back on track and on budget. For others, such as a report on the new Everton stadium for Laing O'Rourke in Liverpool, this took place in the pre-bid phase and assisted them in formulating their winning bid."

"Being that these reports can cover multiple years, our cutting edge meteorological teleconnections work allows us to identify projected large scale changes months in advance. While we can't tell you exactly which day is going to be the windiest, on a monthly scale we can tell you about the expected variation in downtime compared to a 'normal' year, allowing planning teams to account for downtime long before it happens. These reports can be made to meet any requirements the client has, we have done reports for various combinations of wind speeds, gust speeds, temperatures, and rainfall totals. Changes in requirements over the course of a project can also be reflected, and a supporting meteorological report is provided alongside the results to explain the data in full. The format of the results can also be made to best suit the needs of the team, and we have produced data in various formats including bar chart, line plot and tables."

## METSWIFT REPORTS

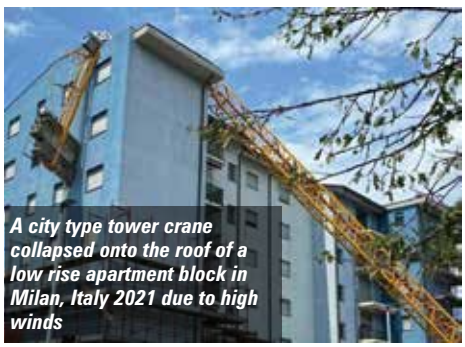
MetSwift Reports are compiled by senior meteorologists using its proprietary models and highly cleansed data to create bespoke information on sector specific weather. These are available on an ad hoc or subscription basis either for one off project planning, regular market analysis or seasonal risk analysis.

Traditional forecast models perform complex physics calculations using super computers performing many thousands of calculations for every grid point in their area. This means that the grid resolution has to be limited - for example every 25 square kilometres - otherwise the calculations would take far too long to run. This can leave a specific site miles away from the nearest point that the model really forecasts, leaving you at the mercy of various assumptions and interpolations.

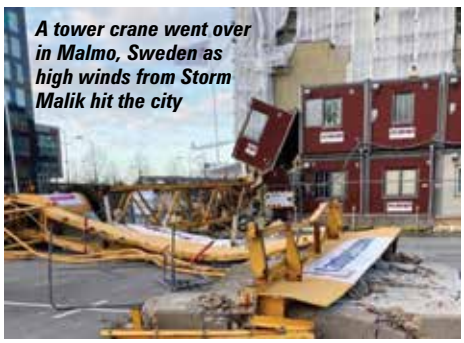
The HLP has much greater accuracy for operational planning by using strategically placed onsite weather stations - perhaps every kilometre or less - in addition to the Delos model which utilises AI to produce a significantly more accurate one to 10 day forecast for a specific location.

"By using on-site data, alongside visits from our team to see the area in which you are working, we can remove these assumptions and teach the model about your local microclimate, topography and land use," says Ryan. "Changes to the site over the course of the project can also be reflected in our data, either through adjustments to factors such as surface roughness that affect how wind changes with height, or changes in the weather station data itself that the model will learn from each day. At the Align site, the topography changed significantly due to the earthworks, and some stations were moved due

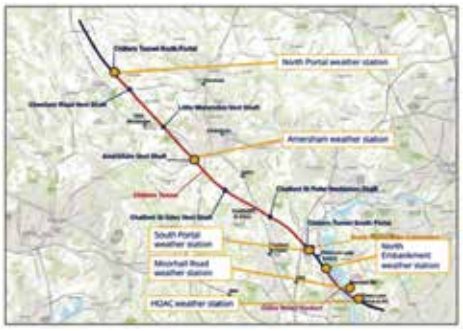
| System | Most accurate model for windspeed | Correctly predicting operational window - gust speed | Forecasting downtime due to gust speeds when actual observed conditions were safe to operate |
|---|---|---|---|
| GFS | 7% | 67% | 29% |
| XC Weather | 7% | 63% | 34% |
| MetSwift | 86% | 93% | 3% |



*A city type tower crane collapsed onto the roof of a low rise apartment block in Milan, Italy 2021 due to high winds*



*A tower crane went over in Malmo, Sweden as high winds from Storm Malik hit the city*



*Weather stations used on the HS2/Colne Valley Viaduct project*

to changes at the site. In both cases, the HLP was able to adjust without any interruption or loss of accuracy to the Align team."

"We use data from more than 50,000 WMO (World Meteorological Organisation) approved weather stations, disregarding unverifiable data and less credible sources," adds MetSwift meteorologist Joseph France. "The data is then put through a rigorous cleansing and automated normalisation process. For our purposes there is no better set of weather data."

"We are now recognised as leading experts in the behaviour of large scale weather patterns - teleconnections - and their impact on localised weather. These teleconnections are slow changing and our ALR model maps their movement over a 24 month period. The model has a constantly improving understanding of how these govern the weather and together with a blend of historical data, meteorological science, and climate analogues combine to deliver probabilistic predictions and likely weather conditions."

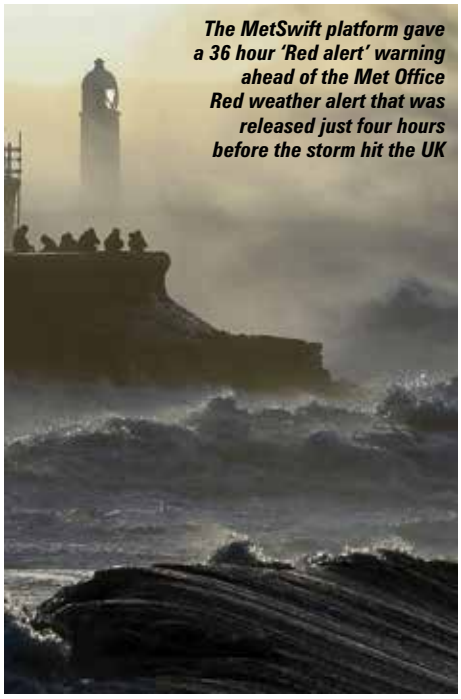
"Our HLP model also learns from hourly onsite weather station observations and traditional NWP (Numerical Weather Prediction) forecast data, to significantly improve the accuracy of one to 10 day forecasts for site specific locations."

## SIGNIFICANT EVENT - STORM EUNICE

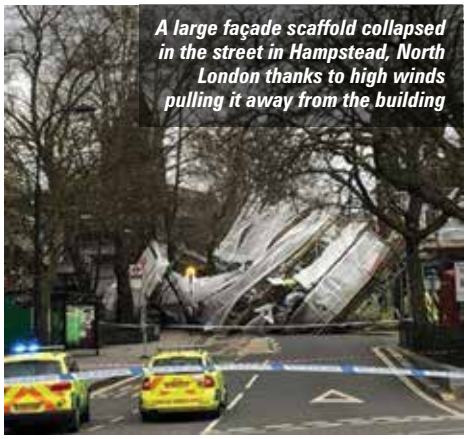
The system in action was seen on February 2022, when Storm Eunice - a significant weather event i.e. a one in 100 year storm - hit the UK.

"Using the MetSwift platform we had a 36 hour 'Red alert' warning ahead of the Met Office Red weather alert that was released just four hours before the storm hit the UK," says Ryan. "This type of forewarning enabled Dave Hall on the Colne Valley Viaduct project to proactively inform senior management of the confirmed coming event. Based on this information alone a decision was made to close the project sites across the C1-ALIGN Trace throughout the event, leaving just key emergency personnel in place. Project wind speeds reached 55mph, while RAF Northolt recorded 69mph, just six kilometres from our project."

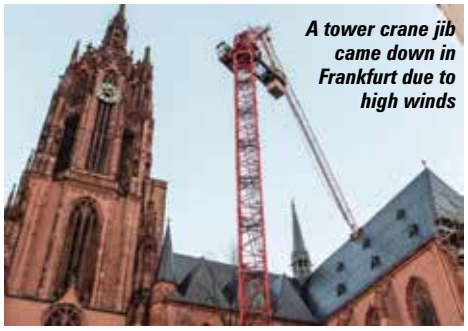
The MetSwift Use & Accuracy Report for the C1-ALIGN HS2 project has highlighted the significant benefits of integrating the AI driven weather forecasting into large scale infrastructure projects. The 1.5 square kilometre forecasting resolution offers superior insights, adding in key project tasks like earthworks, concrete pours, and safety planning during extreme events like Storm Eunice. This demonstrates how accurate forecasts can enhance safety, efficiency, and be really cost effective, helping set a new standard for weather data integration for industries such as construction or dockside work. ■



***The MetSwift platform gave a 36 hour 'Red alert' warning ahead of the Met Office Red weather alert that was released just four hours before the storm hit the UK***



***A large façade scaffold collapsed in the street in Hampstead, North London thanks to high winds pulling it away from the building***



***A tower crane jib came down in Frankfurt due to high winds***

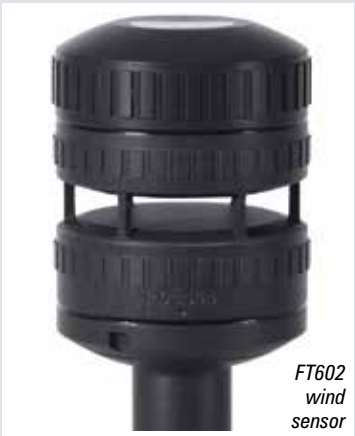
# WORLD'S TOUGHEST WIND SENSORS

**FT wind sensors has earnt a reputation as the world's toughest wind sensors having passed more than 30 independent tests including sand, dust, ice, vibration, corrosion, hail and lightning protection as well as undergoing the FT Highly Accelerated Life Cycle test, which involves temperature cycling from +125 degrees C to -90 degrees C while being subjected to 30G RMS vibrations.**

However, the main difference between other mechanical and ultrasonic wind sensors is its acoustic resonance Acu-Res Technology - a solid-state technology with no moving parts to wear down or degrade resulting in lower maintenance costs, no periodic calibration and reliable data. Temperature, pressure and humidity affect the speed of sound through air. FT claims that its wind sensors continuously monitor and validate signal quality, automatically adjusting to ensure consistent, accurate data output in all conditions. Due in part to the high signal to noise ratio of the acoustic resonance measurement method, wind readings are unaffected by shocks and vibrations. This makes FT wind sensors ideal for use on moving or unstable platforms. FT wind sensors are manufactured in the UK and have been widely used in the wind turbine control industry for more than two decades.

The company was founded in 1981, however it was in the 1990s when the Acu-Res technology began when the UK government needed a wind sensor for ballistic meteorology that was robust enough for battlefield conditions i.e. no moving parts. By using a small acoustic sensor that would resonate sound waves within a cavity, FT was able to measure the phase shift of moving air. This approach would eliminate the need for moving parts and allow for a smaller, more durable and easily heated sensor.

In 2000, the first FT702 acoustic resonance wind sensor went into serial production. Designed with a stainless steel body, it was intended for meteorological use however its durability and precision made it ideal for wind turbine control. Today the 752 series measures wind speeds of up to 90 metres per second and is aimed at industrial markets including wind turbine control, commercial marine, and many other critical safety and control applications and is now being adopted by high end lifting equipment, including cranes and big truck mounted lifts.



*FT602 wind sensor*