



Brüel & Kjær Vibro

# uptime

megazine

02|14



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**RENEWABLE ENERGY: DIAGNOSTICS OF DFIG**  
**FIELD: SAPREF PROJECT**  
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Uptime Megazine is a newsletter published by Brüel & Kjær Vibro to keep you up-to-date with new machine monitoring trends and technologies. This issue focuses on the VIBROTEST 80 release.

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## MORE POWERFUL, MORE VERSATILE – “ALLROUNDER” HANDHELDS PLAY A VITAL ROLE

**Dr. Peter Kytka**

*Portable Instruments  
Product Manager*

Simply stated, there is an increasing and unrelenting need in industry to maximize production at minimum cost. It doesn't matter if you are in the petrochemical, energy, process or manufacturing industry, profitability highly depends on how well you produce. This need has motivated condition monitoring companies such as ours to innovate technological solutions to ensure the production machines are running reliably and efficiently - all the time – and with minimal life cycle costs. We offer a wide portfolio of products and services to help our customers to achieve this, and the portable monitoring instruments such as the VIBROPORT 80 and VIBROTEST 80 are an important part of our solution.

Often overshadowed by the permanently installed online monitoring system, the handheld actually plays an important role in predictive maintenance strategies. Firstly, field balancing still remains the domain of the handheld because of its portability and flexibility. Secondly, data collecting and monitoring of balance-of-plant and remote machines is still the most cost-effective solution for monitoring these types of machines in many industries. And finally, if a machine fault is detected, the handheld offers exceptional fault analysis and root cause analysis capability

to diagnose that fault – even rivalling or exceeding what is offered by many online systems!

In developing all of this functionality for our handhelds, we went one step further. We integrated all of this multi-purpose functionality into the VIBROTEST 80, after the successful launch of the VIBROPORT 80. The VIBROTEST 80 portable monitoring instrument, which is 50% lighter, now completes our portable product line under the umbrella VIBROTEST 80 & VIBROPORT 80; the allrounders for machine diagnosis, field balancing and condition monitoring.

I'm pleased to launch this issue of Uptime, where we are also releasing our new product. I hope you enjoy reading about this handheld and the other interesting stories in this issue of Uptime. ■

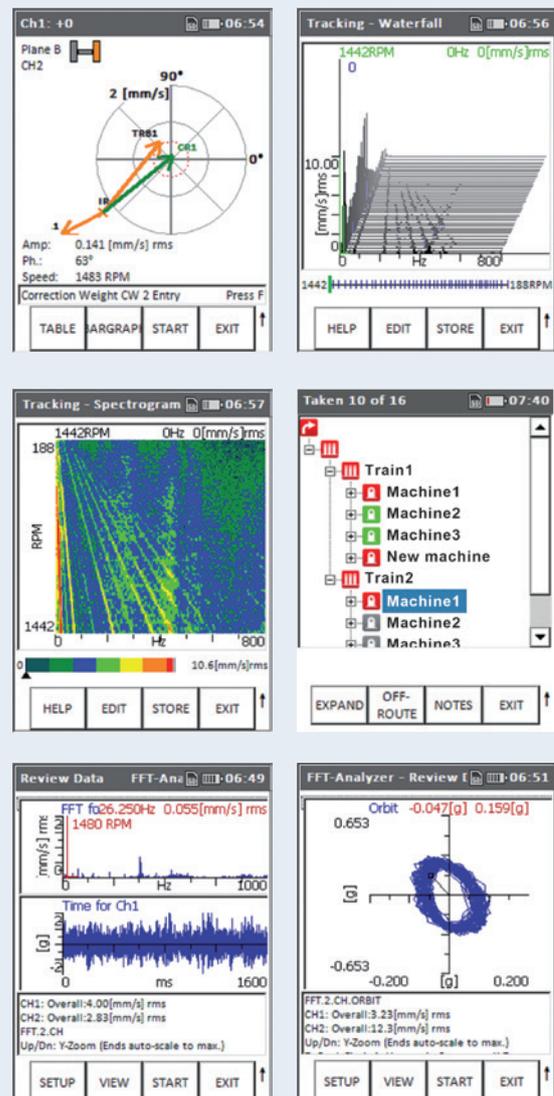
# VIBROTEST 80 – THE DATA COLLECTOR WITH POWERFUL ANALYSIS AND BALANCING CAPABILITY

VIBROTEST 80 is the newest vibration measurement handheld from Brüel & Kjær Vibro. Its lightweight, rugged, compact design makes it ideal for route-based data collection, and it can easily be upgraded to a comprehensive four-channel vibration measurement device providing extensive analysis and balancing functionality.



VIBROTEST 80 is a multi-purpose handheld that is lightweight and easy to use.

## SCREEN DISPLAYS FOR VIBROTEST 80



The colour screen display is easy to read. Upper left clockwise; balancing polar plot, FFT waterfall plot, data collection route, orbit plot, FFT with time signal and a spectrogram.



VIBROTEST 80 (upper photo and lower photo, on the right). This is a compact version of the VIBROPORT 80 (lower photo, on the left).

Since the early 1970s, Brüel & Kjær Vibro have been successfully developing solutions for maintenance-based condition monitoring and field balancing of machines in numerous industrial applications. The VIBROTEST 80 design is based on the cumulative experience of a wide range of portable vibration measuring instruments.

The VIBROTEST 80 is a compact version of our VIBROPORT 80 handheld that was launched two years ago with great success. It has the same analysis and balancing functionality but with a smaller screen. (In fact, the VIBROPORT 80 has just been released with the same data collector functionality, so now the instruments are different only in size and price!)

Despite the extensive functionality offered by the VIBROTEST 80, the user-friendly design lends itself to both inexperienced operators and specialists alike. Its modular concept gives it the necessary flexibility and scalability to tackle the simplest as well as the most demanding customer requirements in a cost-effective way. It is also available in an Ex version (ATEX certificate) for use in explosive environments.

The instrument is available in packages tailored to the user's application. The **Data Collector** packages, for example, include all basic accessories, sensors, robust carrying case, and the powerful Report & Route Manager Software. This Windows® based PC host software includes:

- Easy setup of measurements, alarms and routes
- Powerful filter function for viewing data and making reports for a specific machine, date/time, alarm level and/or measurement type
- Special plots and cursors – 3-D waterfall/spectrogram and gearbox cursor
- Fast detection of machine faults with alarm indicators
- Database of bearing fault symptoms. User-defined symptoms can be added, including harmonics/sidebands, etc.
- Possibility to import data from VIBROTEST 60 and xms® software

The VIBROTEST 80 is available in a number of other complete packages, such as for both starters and experienced users. It can also be upgraded by other firmware modules at any time to extend the comprehensive vibration monitoring capability, as the need arises.

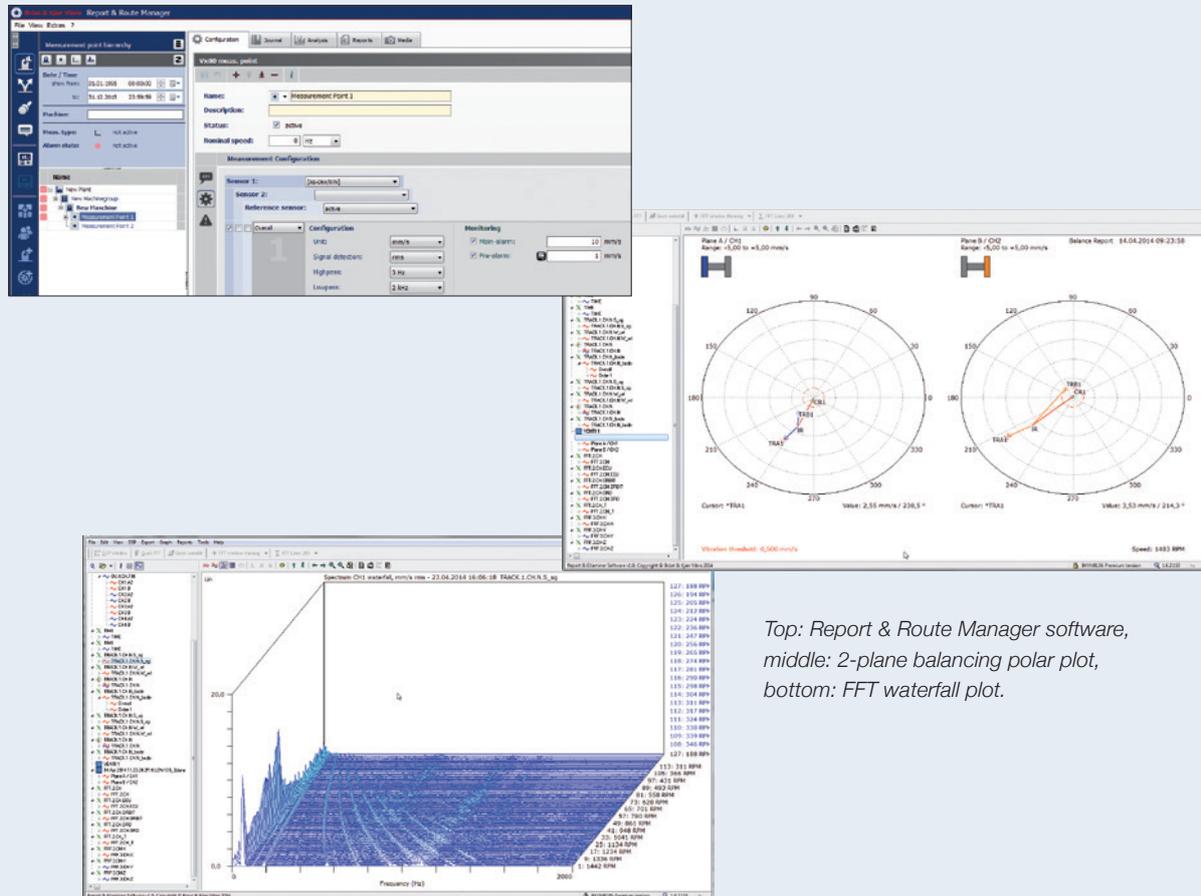
Are you ready to make a positive impact on your machines' productivity? Contact us at [info@bkvibro.com](mailto:info@bkvibro.com) or see our website [www.bkvibro.com](http://www.bkvibro.com) for more information. ■





The VIBROTEST 80 packages are complete, with all the necessary accessories and software needed to start monitoring.

### HOST COMPUTER MONITORING SOFTWARE DISPLAYS



Top: Report & Route Manager software, middle: 2-plane balancing polar plot, bottom: FFT waterfall plot.

## PAPER PRESENTED ON NOVEL DIAGNOSTIC TECHNIQUE FOR WIND TURBINE GENERATORS



**A**lexandros Skrimpas and Christian Sweeny, vibration diagnosticians from the Brüel & Kjær Vibro Surveillance and Diagnostic Service Centre in Denmark, together with other co-authors, are presenting a paper at the XXIIth International Conference on Electrical Machines (ICEM 2014) in Berlin, Germany, 2-5 September, 2014. The title of the paper, “Analysis of generator bearing vibration data for diagnosing rotor circuit malfunction in DFIGs” deals with the vibration analysis and diagnostics of some specific potential failure modes associated with the doubly-fed induction generators (DFIG), which are typically used in the wind turbine industry (see insert box for a description of this type of generator).

The multiphase slip ring assembly used in the DFIG is the cause of some of the maintenance issues associated with the DFIG. A novel method for reliably detecting and diagnosing some of these faults, such as an open rotor phase coil, is demonstrated in the paper. The technique enables the operator to more accurately distinguish this fault from other similar faults, such as mechanical looseness. ■



**Alexandros  
Skrimpas**

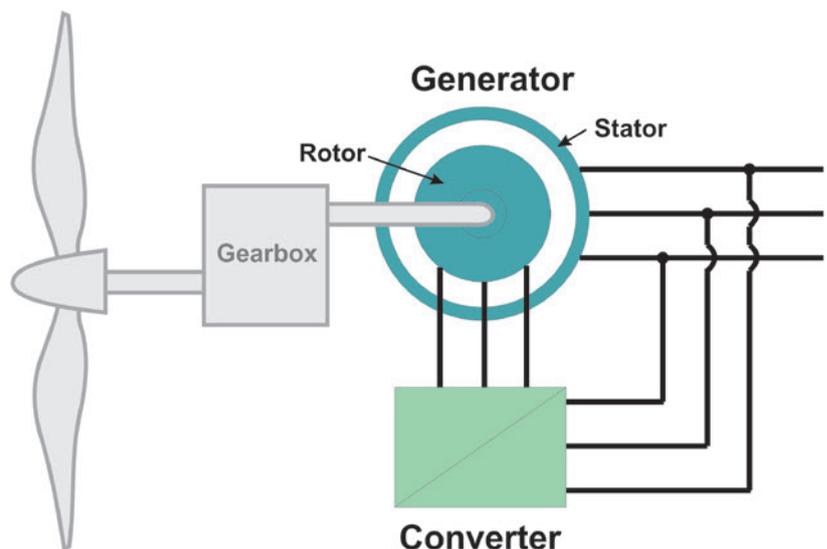


**Christian  
Sweeney**

### DOUBLY-FED INDUCTION GENERATORS

Wind turbines were originally designed to operate at fixed speeds, with only small speed variations of 1-2% allowed. This design proved to be not very practical in variable wind conditions, and therefore was never really economical. A variable speed generator was needed. Power electronics technology has improved over the years, eventually leading up to the doubly-fed induction generator (DFIG) design, which currently accounts for approximately 65% of all wind turbine installations. The DFIG is a variable speed generator that has windings on both the stator and the rotor. The stator windings feed active power directly to the grid, while the rotor can either feed or consume power from the grid via slip-rings and a converter, depending on the generator shaft speed. This design has a major benefit; the converter controls only the rotor voltages and currents, so the rotor frequency can vary freely. This means the generator can be synchronized to the grid even though the rotational speed of the wind turbine varies. Another benefit is that the generator can import and export reactive power to the grid, which can help stabilize it. Moreover, the overall efficiency of the DFIG is high in relation to singly fed generators.

*Schematic showing the grid power connections to the doubly-fed induction generator.*





# SOUTH AFRICA'S LARGEST REFINERY INSTALLS **COMPASS 6000™**

FIELD NEWS





**B**rüel & Kjær Vibro have been selected to deliver a comprehensive condition monitoring system to South African Petroleum Refinery (SAPREF, a joint venture between Shell SA Energy and BP Southern Africa). Located near Durban on the east coast of South Africa, SAPREF is the largest crude oil refinery in the southern part of Africa. With a production capacity of 8.5 million tonnes per year (170,000 bbls/day), SAPREF provides 35% of the total refining capacity in South Africa.

A major refinery upgrade was initiated in 2013 in order to meet the stringent clean air 2 fuel specification requirements within the next few years. The upgrade is intended primarily to reduce sulphur, benzene and aromatics content in the fuel production, so there are a number of projects in this brownfield investment to support this goal. One of these includes upgrading the instrumentation control and monitoring

systems. Compass 6000™ was selected during this phase of the project for upgrading part of the existing machine monitoring system.

Compass 6000™ is installed to monitor two major turbine compressor trains in the plant. Condition monitoring plays a particularly important role in this plant, especially with regard to the new upcoming production requirements for the machines. Production streams have to be more exacting, and process loads can be variable. These process conditions can subsequently reduce the predictability of maintaining the machines, and actually increase the risk of premature faults occurring. Compass 6000™ provides the necessary functionality, however, to detect and diagnose faults early under these adverse operating conditions and thus minimize downtime. ■

## MAINTAIN 2014 CONFERENCE IN MUNICH, GERMANY

EVENTS



Industrial maintenance is an important topic in Germany, and Maintain is recognized as one of the biggest marketplaces in Europe for promoting innovations and various service solutions in this business between the professionals. Our Sales Representatives have been actively partici-

pating in this event for the past several years, and this year, special preparations were made for launching the VIBROTEST 80 data collector (described in this issue of Uptime). There were presentations and a handful of specialists present who eagerly answered questions and gave de-

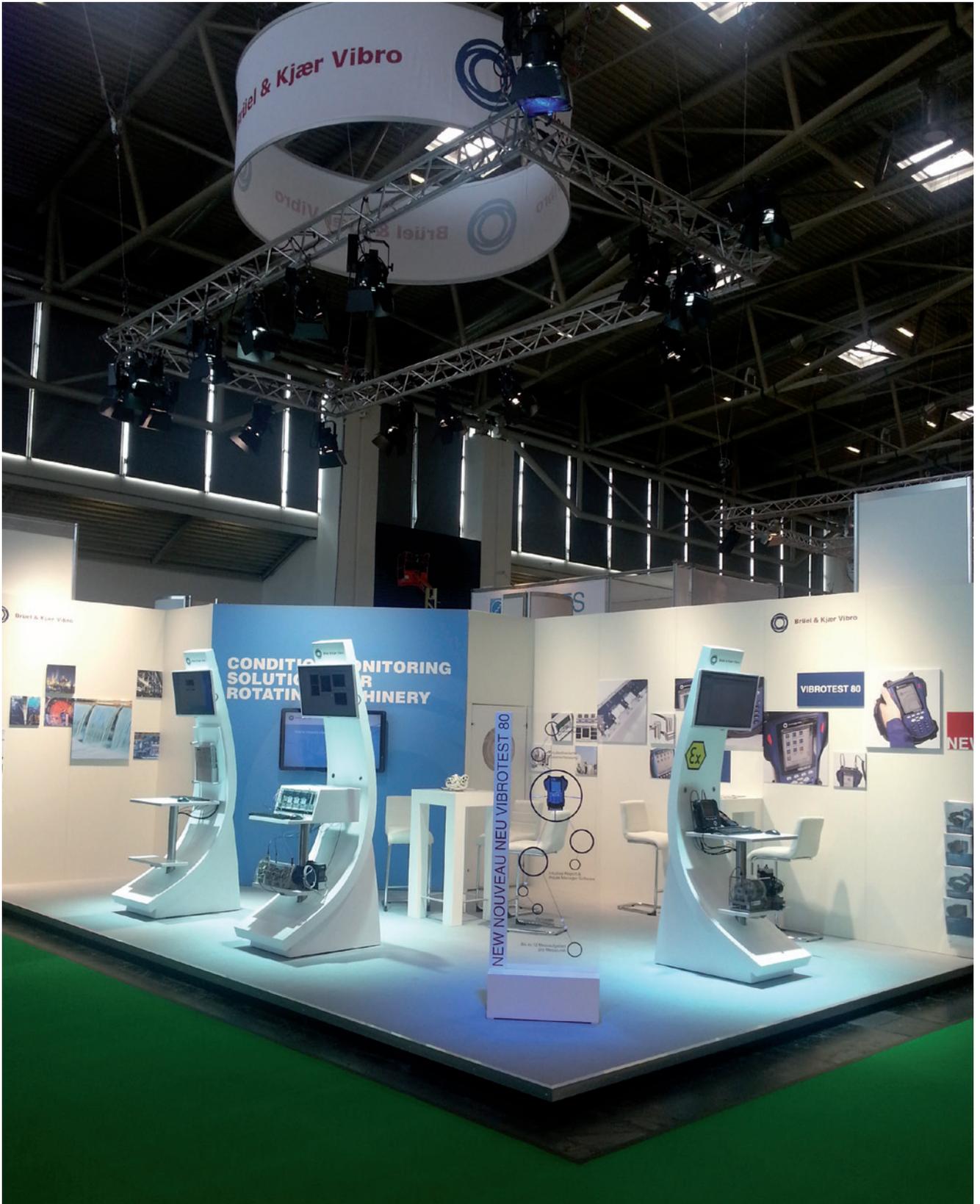
monstrations. The turnout and interest was great.

We thank all the visitors who came by the booth to find out more about our condition monitoring solutions, and our staff for the tremendous effort in making this show successful. ■



*VIBROTEST 80 launch at the Maintain 2014 conference.*

Our stand at the Maintain 2014 conference.





**WINDENERGY HAMBURG  
HAMBURG MESSE UND CONGRESS  
23 - 26 SEPTEMBER 2014,  
HAMBURG, GERMANY**

Learn more about our dedicated monitoring solutions for the windpower industry at our stand 130 in Hall B7.

**[www.windenergyhamburg.com/en/homepage](http://www.windenergyhamburg.com/en/homepage)**



**HYDRO 2014  
INTERNATIONAL CONFERENCE  
AND EXHIBITION  
13 - 15 OCTOBER 2014,  
VILLA ERBA, CERNOBBIO, ITALY**

The pace of hydropower development worldwide is continuing to accelerate; recent progress has been substantial, and prospects are promising for the coming years. HYDRO 2014 will bring together planners, developers, owners, financiers, consultants and suppliers to discuss planned developments, the challenges ahead, and innovations in technology. Visit our stand 389 in the Cernobbio Wing to learn more about the vibration monitoring of hydropower machinery.

**[www.hydropower-dams.com](http://www.hydropower-dams.com)**



**HYDROVISION 2014  
TRANSAMERICA EXPO CENTER  
21 - 23 OCTOBER 2014  
SAO PAULO; BRASIL**

HydroVision Brasil is Brazil's only event dedicated 100% to the hydropower industry. The educational program is designed specifically for individuals working within the utility and private power sectors, as well as engineering and commercial personnel from the equipment manufacturing and consulting fields. The event features content directly relevant to the day-to-day operations of the hydroelectric industry, focusing on solutions and practical approaches to timely issues and challenges. Visit our booth at C414 in Hall C.

**[www.powerbrasilevents.com/en/hydrovision-brasil.html](http://www.powerbrasilevents.com/en/hydrovision-brasil.html)**