SPM

Leonova® DIAMOND

SPM
condition monitoring solutions

SPM Instrument AB
www.spminstrument.com
www.leonovabyspm.com

PORTABLE INTELLIGENCE

CONDITION MONITORING IN A LEAGUE OF ITS OWN

Leonova® DIAMOND

di·a·mond **\ˈdī-(ə-)mənd**
The hardest naturally occurring substance known; also the most popular gemstone. The durability, strength and versatility of the gemstone inspired us to name the instrument Leonova Diamond.

UNIQUE CONDITION MONITORING EFFICIENCY

TECHNOLOGY MEETING SIMPLICITY

No matter what industry you are in or what equipment you run, and whether straightforward or complex, your production environments and processes require knowledge and understanding in order to optimize maintenance practices.

Condition monitoring the SPM way is uniquely easy to learn and practice. Our highly advanced measuring techniques, optimized for a minimal and smooth learning curve, quickly brings your maintenance department up to speed and enables rational management of large numbers of routine measurements. Immediate, on the spot condition evaluation is also a trademark of all SPM measuring devices.

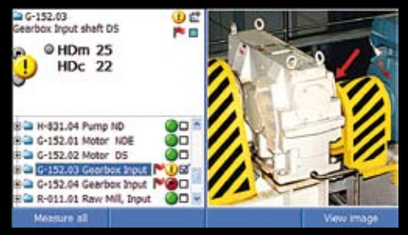
The patented and award-winning SPM HD® measuring technique broadens the potential scope of condition monitoring to include more machinery than ever before. A maintenance productivity boost, it brings to light machine problems which are impossible to monitor with traditional vibration measurement techniques.

PORTABLE PRODUCTIVITY AND EFFICIENCY

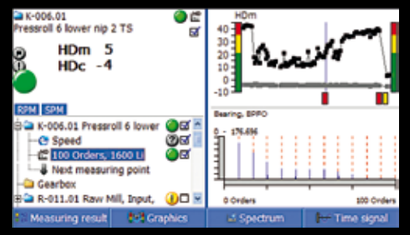
Leonova Diamond® is a portable instrument for condition measurement in rough industrial surroundings. This heavy-duty yet sophisticated instrument brings powerful analysis and troubleshooting capabilities to your condition monitoring program. Wherever measuring route efficiency is a priority, Leonova Diamond is the perfect choice, providing a powerful combination of well-proven measuring techniques for every situation all in one instrument.

Leonova Diamond is the latest proof of our commitment to developing first class condition monitoring products for more profitable maintenance. In a direct response to feedback from SPM customers across the globe, we developed an instrument that will deliver long working life under the toughest, most demanding circumstances.

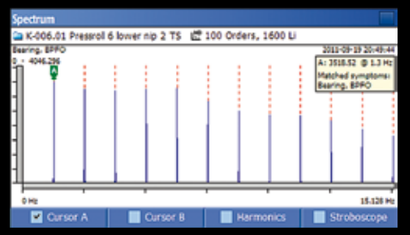
For use in hazardous areas and hostile environments, an intrinsically safe version is available.



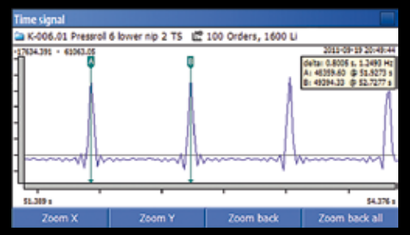
Measuring point window with photo



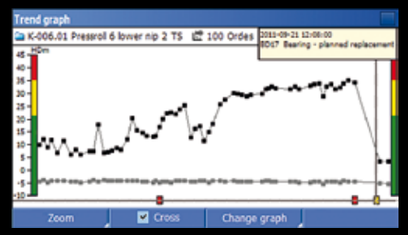
SPM HD - Measuring result



BPFO symptom in SPM HD spectrum

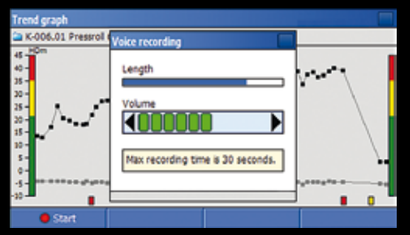


SPM HD - Time domain analysis

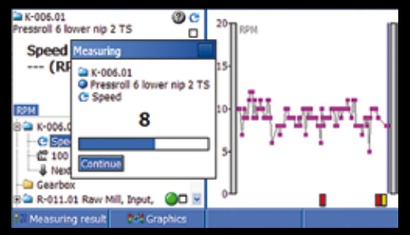


Trend graph with historical data

Band alarms in SPM HD spectrum



Voice recording of comments



Speed measurement

BEARING MONITORING AS YOU HAVE NEVER SEEN IT

BEARING MONITORING WITH SPM HD®

SPM HD is a new achievement in condition monitoring technology and a groundbreaking solution to problems involving condition measurement on low speed machinery.

The method is a patented evolvement of the well known and reliable True SPM® method, commonly recognized as the best method for measuring bearing condition on rotating machinery. The original Shock Pulse Method was developed specifically for condition monitoring of rolling element bearings. The method is characterized by its ease of use, presenting easily understood and reliable information on the mechanical state of the bearing and its lubrication condition. Requiring little input data, the method measures signals from rolling element bearings and instantly evaluates the condition in intuitive green - yellow - red condition codes. The SPM HD method is also very effective for detecting gear mesh signals, caused for example by damaged teeth.

Where established methods fail, SPM HD detects deteriorating bearing condition and incipient failures with impressive accuracy and exceptional prewarning times. The perfect companion to vibration analysis, SPM HD can be used successfully on all types of machinery with rolling element bearings.

ULTRA LOW SPEED BEARING MONITORING

The premature failure of bearings in low speed machinery is a notorious problem. The special requirements associated with measurement on low rpm applications have been beyond the limits of established monitoring techniques – until now.

SPM HD is unrivalled in its ability to measure across the entire 1-20.000 rpm range. Advanced digital algorithms provide very high dynamics, enabling the method to distinguish the desired signal from background noise. The signal is picked up and enhanced, resulting in a clear and unobstructed view of machine condition.

Measuring results are presented in never-before-seen detail, giving a crystal clear picture of bearing condition. Razor sharp spectrums and time signals bring root cause analysis to a new level of understanding. Based on readings and expanded knowledge, bearing lubrication is readily optimized helping to significantly prolong bearing life.

Extending the scope of predictive maintenance to include condition monitoring at low speeds, SPM HD is all the bearing monitoring technology you need.

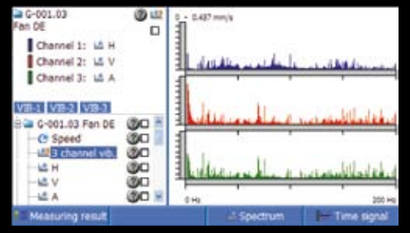
HIGH DEFINITION ORDER TRACKING

Leonova Diamond offers advanced and innovative order tracking functionality. Thanks to careful engineering and optimal use of digital technology, the powerful HD Order Tracking enables more precise measurements and more detailed spectrums than ever before.

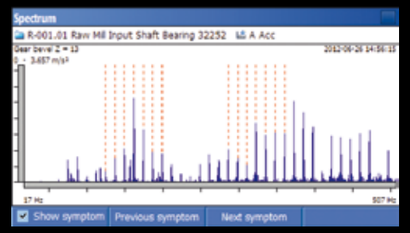
For shock pulse and vibration analysis on variable speed machinery, the progressive and patent pending order tracking algorithms very carefully trace RPM variations occurring during data aquisition. The sampling rate is automatically and continuously adjusted to the current speed, producing spectrums with spectacular clarity and no smearing problems. Close observation and detailed bearing and vibration analysis is now possible even on the most complex industrial applications.

Order tracking is applicable in a very wide RPM range, from just a few to thousands of revolutions per minute. The unique order tracking algorithms interpolate speed with superb accuracy even when RPM varies heavily.

For RPM measurement, tachometer, stroboscope, NPN, PNP or Keyphasor® input is accepted. Stroboscopes can also be controlled via an instrument output signal.

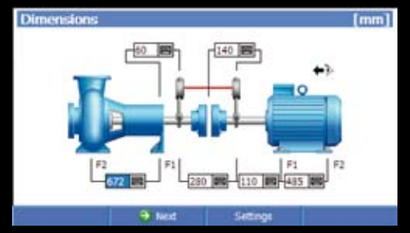


Tri-axial vibration measurements

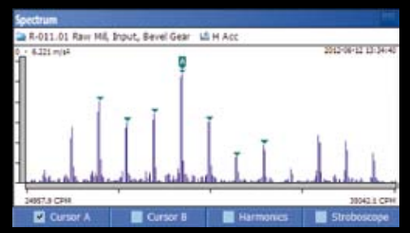


Spectrum with gear symptom

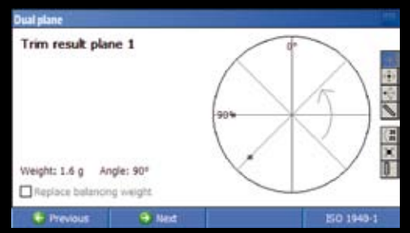
EVAM - trend evaluation



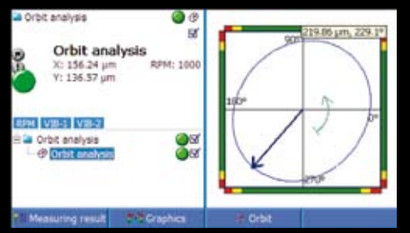
Laser shaft alignment



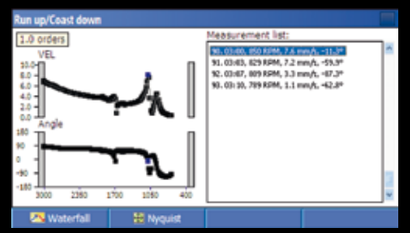
Gear box spectrum with sidebands



Dynamic balancing, single and dual plane



Orbit analysis



Run up - coast down measurements

FIRST CLASS VIBRATION ANALYSIS

HIGH-PERFORMANCE VIBRATION ANALYSIS

Leonova Diamond offers highly sophisticated vibration measurement. The instrument provides razor-sharp spectrums even where signals are weak and low in energy content. The need for gain adjustments has been designed out, giving an excellent signal-to-noise ratio; a decisive advantage where weak signals are present among stronger signals, such as in gearboxes.

Vibration severity monitoring diagnoses general machine condition. In the 0-40 kHz frequency range, Leonova Diamond measures vibration velocity, acceleration and displacement according to the latest ISO 10816 standards. In addition to the RMS vibration readings, the instrument displays an FFT spectrum, where symptoms of imbalance, misalignment and structural weakness are easily identified. Enveloping with band and high pass filters can be selected.

The EVAM measuring technique supplies pre-programmed evaluation models for time and frequency domain parameters. FFT analysis produces a 25600 line spectrum with true zoom. Measurement data processing, machine fault symptom computation and trending is all done in the instrument.

ADVANCED AND USEFUL FEATURES

On machinery operating under variable speed, vibration analysis with HD Order Tracking provides reliable data and crystal clear measuring results even when RPM varies greatly during the course of measurement.

The wide frequency range, covering from DC to 40 KHz, enables measurement where absolute position is vital, typically in shaft centerline plots. For machinery with journal bearings, Leonova Diamond reliably measures dynamic and centerline movement of the shaft.

Simultaneous measurement on three channels enables the use of triaxial transducers and multi-axes vibration monitoring while also cutting long measuring routes down to a minimum of time.

The capacity to handle negative voltage levels permits direct measurement for instance on the buffered outputs of other monitoring systems, without the need for extra equipment.

Providing maximum value, performance and control, Leonova Diamond is the perfect tool for the advanced vibration analyst.

CORRECTIVE MAINTENANCE TECHNIQUES

Root cause elimination is true preventive maintenance. A poorly aligned and balanced machine wastes much energy and wears itself out. Leonova Diamond provides sophisticated tools for root cause analysis and corrective maintenance.

Structural resonances: Run up/coast down measurement and Bump test show machine frame vibration characteristics, resonance frequencies and the reaction at critical speeds.

Shaft alignment: For laser alignment of horizontal and vertical machines, the optional LineLazer alignment kit connects to Leonova Diamond with only one cable, and the graphical interface guides the user through the alignment procedure to a perfect result.

Dynamic balancing: Field rotor balancing in single and dual plane according to ISO 1940-1 standard is fast and reliable. An initial vibration measurement clearly shows the existence and extent of unbalance. Step by step, Leonova Diamond guides the user through the balancing procedure, suggesting a number of alternatives for correcting the imbalance. Re-balancing calculations are done and results stored in a file for printing, documentation and follow-up purposes.

MADE TO MEASURE

EMBEDDED INTELLIGENCE AND RUGGED DESIGN

Leonova Diamond is built to withstand harsh environmental conditions. Heavy industries like oil refineries, chemical plants, extractive and offshore industries are challenging environments. The wear-and-tear resistence of Leonova Diamond makes it perfect for these and other demanding industrial settings.

Inside and out, Leonova Diamond is designed to last. Its durability and sturdiness are attributed to an uncompromising choice of premium quality components. Thanks to the heavy-duty, rubberized enclosure where connectors are well protected and electronic components reliably and securely attached, Leonova Diamond will endure shocks and impacts, extremes of vibration or temperature, electromagnetic fields and 1 meter drops onto concrete.

But the robust and rugged design does not stop there. The instrument is IP65 rated for safe use where exposure to dust, water, humidity, salt or aggressive chemical substances may present a challenge to equipment lifetime.

To ensure continuous operation in abusive industrial environments and deliver supreme performance, durability and reliability, we made Leonova Diamond as tough as they come.

4.3" TFT colour display with automatic back light

Programmable function keys

One hand operation, right or left

Accepts IEPE standard vibration transducers

Carbon-fiber-reinforced enclosure, IP65

Exchangeable Li-Ion battery pack for min. 16 hours normal use

RF transponder for contact free measuring point identification, read and write functions in connection with CondID® memory tags

Drop test 1 meter according to IEC 60079-0

Weight approx. 800 g

Three channel simultaneous vibration monitoring

Frequency range DC to 40 kHz

Dynamic range >100 dB, 24 bit AD

Up to 25600 line FFT spectrum

Pre-fault symptoms for spectrum analysis

Waterfall, phase and real time spectrum

Simultaneous recording for up to 50 hours

Enveloping, true zoom, time synchronous measurement

Stroboscope input/output for rpm measurement

Current and voltage input, 0 – 20 mA / 0 – 10 V

Motor current analysis

Speed measurements 1 – 120 000 rpm

Download thousands of measuring points

Stethoscope function, earphones

Automatic transducer line test

Voice recording of comments

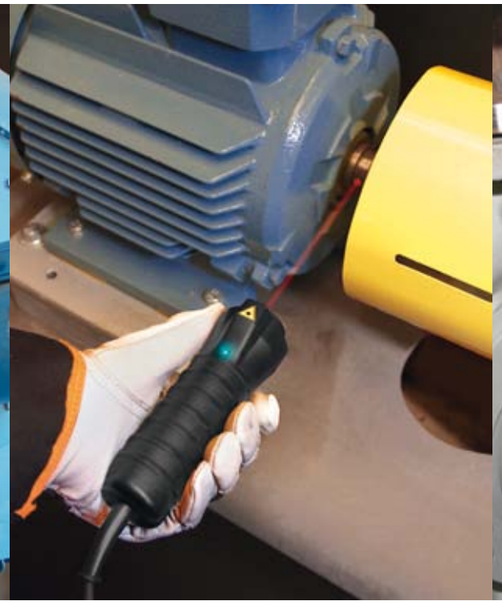
Language selection

Ex version available

RFID measuring point identification

Powerful battery pack - exchangeable

Interfaces for industrial environments



BUILT TO LAST, MADE TO PERFORM

ENGINEERED FOR PERFORMANCE

Leonova Diamond is a dependable and highly potent analysis tool, addressing all of your condition monitoring needs. It offers a full and wide range of sophisticated measuring techniques as well as all the supporting diagnostic and troubleshooting capabilities.

Leonova Diamond efficiently and reliably handles different machine characteristics and variable running conditions. State-of-the-art digital technique and careful software design enables superior data aquisition and processing.

Start-up is rapid; the instrument is ready for measurement when you are. Features such as conditional measurement, continuous order tracking and dynamic alarm limits provide sharp, reliable readings and relevant alarms. General and user defined fault symptoms are automatically computed, evaluated and trended over time. All data processing and condition evaluation is carried out in real time. Multiple measuring assignments can be carried out with the push of a single button. Up to five different parameters can be measured simultaneously. Immediate condition evaluation in green-yellow-red, alarm generation, historical data and trends – all is delivered right there in the instrument, at the point of measurement.

DESIGNED FOR EASE OF USE

A tool is more than its functions. Leonova Diamond is design and functionality working together to combine handiness with excellent performance. Designed for heavy industry, the look and feel of the instrument reflects its intended use.

Simplicity and ease of use characterize the instrument. Leonova Diamond has a light and compact design, enabling an ergonomic one-hand grip. The keypad layout is optimized to allow users to operate the instrument with gloves on.

The intuitive user interface largely corresponds to that of the Condmaster® Ruby software. Programmable software function keys make it possible to customize navigation to user preference.

The large, high-resolution TFT-LCD color screen provides excellent visibility in darkness as well as under daylight and outdoor conditions. The instrument supports split screen, utilizing screen space optimally to allow simultaneous presentation of multiple views.

All input and output connectors are placed away from the display and keyboard for easy access and maximized freedom to operate the instrument.

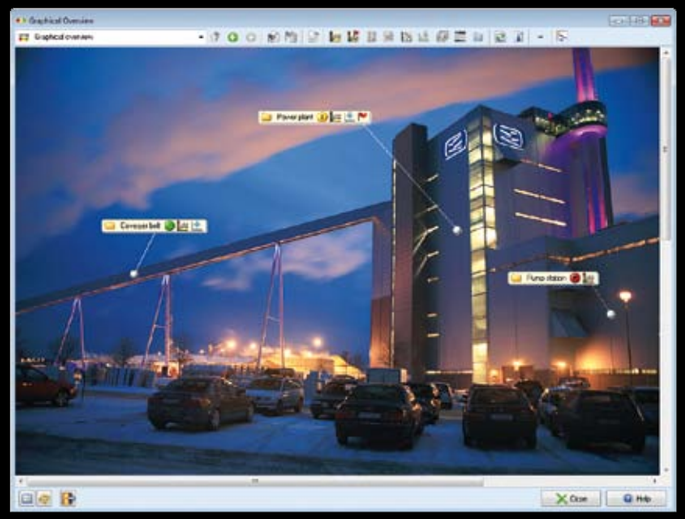
ACCESSORIES AND AUXILIARY EQUIPMENT

In every sense of the word, Leonova Diamond is a multipurpose instrument. To unlock its full productivity potential, a complete range of optional accessories is available.

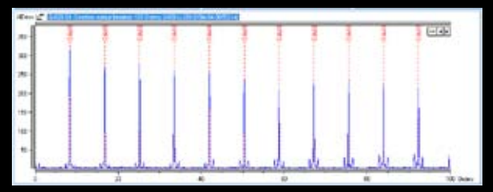
For safe transportation and storage, a durable carrying case with foam insert is provided. Extra, rechargeable battery packs, power adapter and battery charger (100-240V or 12V) offers maximum power flexibility. If measuring routes generate large amounts of data, the instrument can be equipped with extra memory.

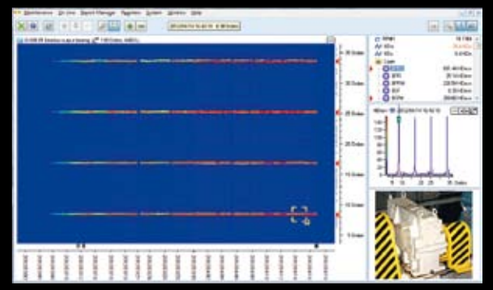
The range of instrument accessories also includes a laser-based tachometer with IR temperature sensor. A headset with microphone is available for convenient voice recording of measuring route comments.

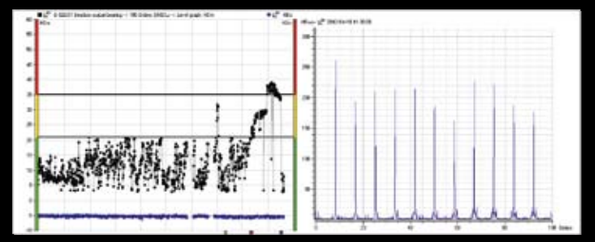
The extensive range of transducers, transmitters and installation accessories meets the requirements for a wide range of applications, including tough and potentially explosive environments, or narrow spaces. Available in a variety of options, there is a shock pulse or vibration transducer for every need. The advanced LineLazer alignment kit and intelligent CondID® measuring point identification tags are useful complements.

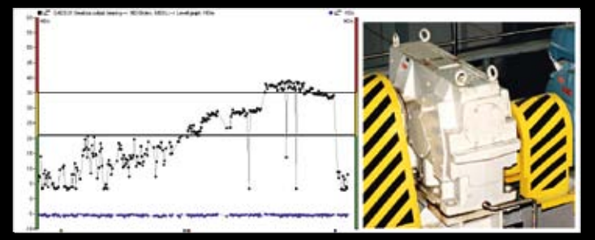


Graphical overview


Symptom match


Coloured Spectrum Overview


Spectrum


Trend graph

POWERPACKED SOFTWARE FOR IN-DEPTH ANALYSIS

CONDMASTER® RUBY

At the heart of an SPM condition monitoring solution is the powerful Condmaster® Ruby software, containing the expert knowledge needed to evaluate machine condition. Condmaster Ruby collects and stores measuring results delivered from all SPM handheld and online measuring devices, for evaluation and presentation. The software is modular and system functionality can be tailored to specific customer needs.

Integral parts of the software are a complete bearing catalogue, lubricant data, bearing life calculation, SPM condition evaluation rules, ISO limit values, mathematical models for spectrum analysis and fault symptom detection, and much more. Condmaster Ruby accomodates administration of all maintenance activities, such as time schedules, measuring routes and work orders. Remote monitoring is enabled via Condmaster WEB.

Optional modules provide support for all measuring techniques as well as additional functionality, such as:

- *Coloured Spectrum Overview* for a historical overview of thousands of spectrums over a longer period of time.
- *Condition Manager* for flexible alarm configuration, where alarm limits automatically adapt to the conditions under which the machine is run at any given time.
- Alarms on component or measuring point level sent to users via e-mail or text messages.
- *Graphical Overview*, where machine and measuring point folders are arranged to preference. Photographs of the plant or individual machine components can be attached and downloaded to Leonova Diamond for instant recognition of monitored equipment.
- *Trending options* make it easy to observe changing operating condition. Readings may be averaged to further simplify analysis and spectrums from individual measuring points can be compared in various ways, e.g. in band alarms. Trending of symptom values presents graphs of evaluated condition and reduces the need to study spectrums and time signals.
- Setup of personalized default settings for Leonova Diamond.

PLANT PERFORMER™ DECISION SUPPORT

For a clear view of your operations and more efficient decision-making, statistical data can be pulled from the system with the Plant Performer module in Condmaster Ruby.

Plant Performer enables strategic analysis of the economical impact of maintenance. It visualizes the scope of the condition monitoring program, providing a statistical overview of monitored equipment. The information is presented in easily understood pie or bar charts.

Statistical assignments are user defined and may include database or machine condition statistics and technical Key Performance Indicators, such as:

- Overall vibration for a department or a machine type
- Loss of contribution due to production downtime
- Operating condition for all electrical motors

FULL FLEXIBILITY AND MODULAR FUNCTIONALITY

PAY FOR PERFORMANCE

Condition monitoring is a management strategy for coping with a highly competitive industrial economy. Over time, condition monitoring will dramatically reduce maintenance costs and have a significant influence on productivity. But condition monitoring costs money for equipment, training and labor. With the scalable instrument Leonova Diamond, you have a free choice of suitable instrument functions and how to pay for their use.

FUNCTION AND USE

The platform is a datalogger communicating with Condmaster Ruby and accepting manual data input. The modular design of the software enables the purchase of individual functions in packages or one by one. Upgrades are easily performed by downloading update files to the instrument.

The purchase of "measuring credits" instead of unlimited use turns most of the investment into operating costs. Platform functions are always free, while each condition measurement costs a few credits, depending on the method. Leonova Diamond keeps count, giving two warnings before the tank is low, then switches to reserve.

CONDITION MONITORING EXPERTISE

SPM Instrument has built reliability solutions for over forty years. A total solutions provider, SPM offers a complete line of measuring techniques and high performance products for condition monitoring of industrial machinery. Bearing measurement and lubrication analysis or advanced vibration analysis – SPM has it all covered. Through a worldwide network of resources, SPM provides full product life cycle support including basic service and calibration at a dealer near you.

In addition to advanced measuring techniques, the powerful lineup of SPM products covers everything from transducers, transmitters and cabling to portable instruments and online monitoring systems controlled by our own power-packed software platform, Condmaster Ruby.

The key to acheiving maintenance goals is training. The ability to correctly measure, evaluate and make decisions is pivotal to successful maintenance. The SPM Academy training facility provides standardized courses and customized training for all levels of staff involved in condition monitoring.

Ask us first. We turn your maintenance problems into possibilities.

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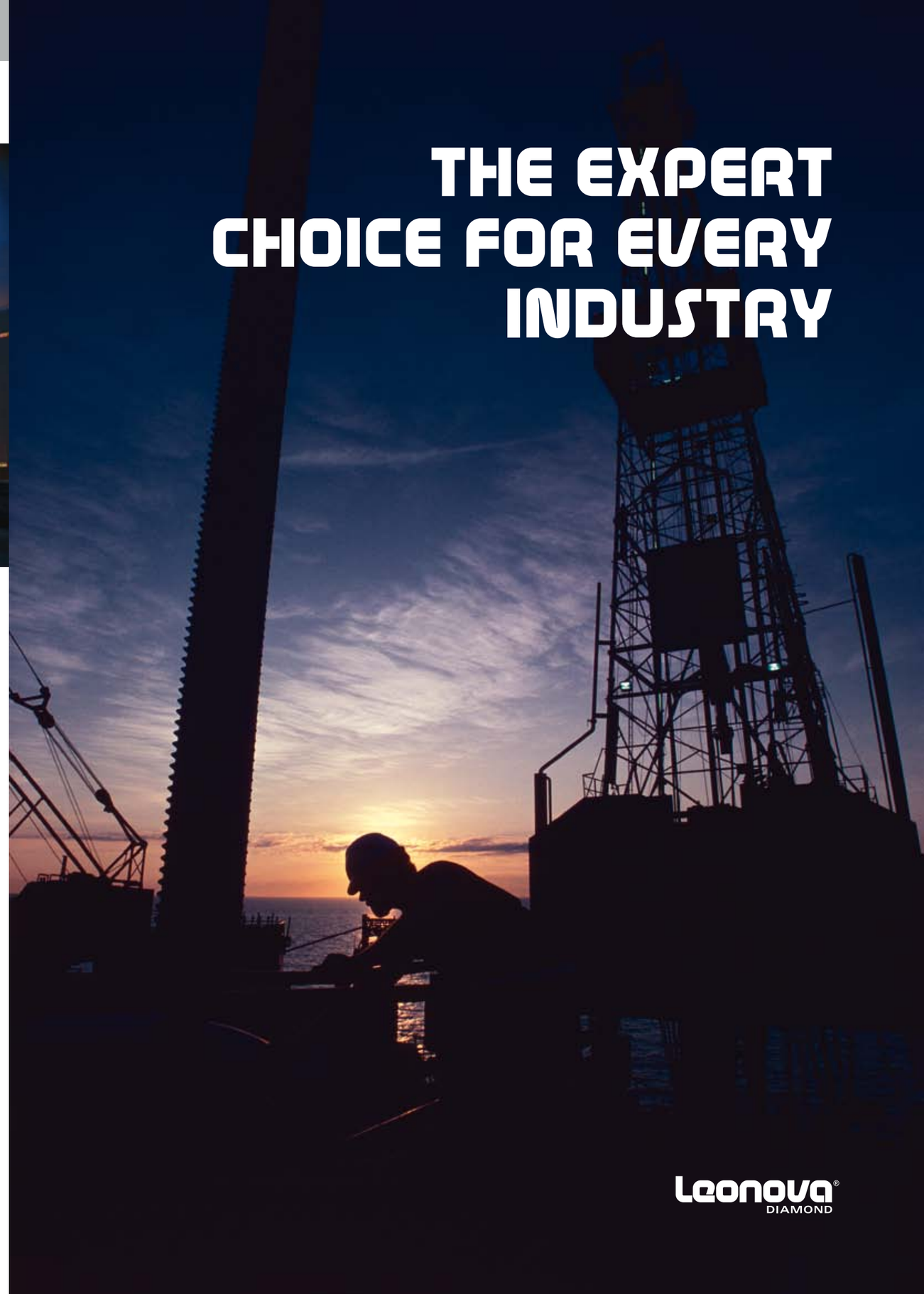
THE EXPERT CHOICE FOR EVERY INDUSTRY



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