SpriteMAX™

Online Monitoring & Diagnostic System

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AZIMA | DLI
Knowing What's Ahead

EFFICIENCY THROUGH AUTOMATION

An evolution in market demand has launched a technological revolution in DLI online monitoring systems. Where online systems were once relegated to monitoring only critical plant assets because of expensive system and installation costs, our innovative new system technology now allows plant managers to automate diagnostic functions and monitor remote installations.

SpriteMAX™

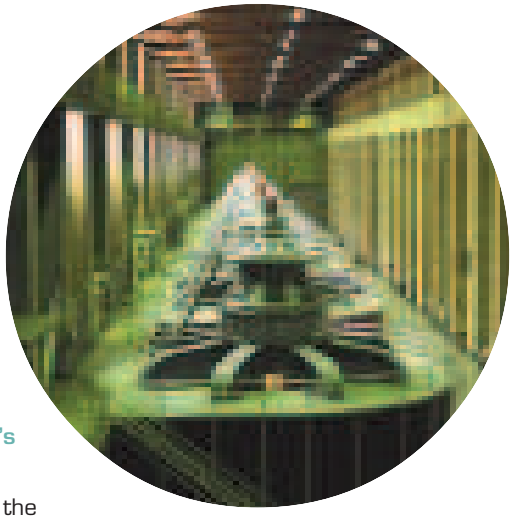
Online Monitoring & Diagnostic System

DLI introduces SpriteMAX™ online monitoring and diagnostic system designed for automated machine health monitoring. SpriteMAX is an independent, modular, powerfully-networked online system that remotely monitors, maintains and automatically reports the health of your plant machinery. SpriteMAX technology is based on simplicity, robustness, connectivity and diagnostic intelligence.

SpriteMAX™

- > Barrier-free Remote Monitoring
- > Low System and Installation Costs
- > Adaptable User Interface
- > Automated Diagnostics
- > Extensive Fault Dectection
- > Proactive Alert System

ONLINE. WIRELESS. AUTOMATED.



> > *No More Barriers to Online Monitoring*

ELIMINATE HIGH SENSOR AND CABLING COSTS WITH SpriteMAX's MODULAR, WIRELESS DESIGN.

Now you can push the power out to the plant floor by integrating plant systems through Ethernet or Wireless Ethernet (IEEE 802.11 WiFi). SpriteMAX's wireless installation feature is an easy, inexpensive alternative to high sensor and cable installation costs associated with traditional online systems.

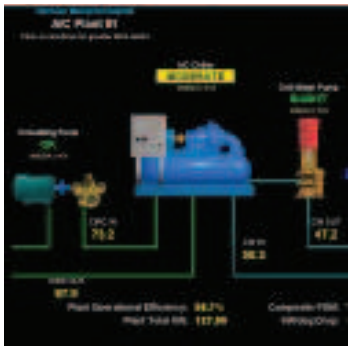
The SpriteMAX can be mounted near the machines to be monitored and transmits its collected data through innovative wireless technology or standard Ethernet. And, remote monitoring at the machine allows you to realize significant cost savings because it eliminates the need for conduit and other complicated system hardware.

SpriteMAX offers design innovations that greatly lower both system and installation costs.

> > *Out-of-the-Box User Interface*

MONITOR MACHINE STATUS AND FAULTS FROM YOUR DESKTOP OR ANYWHERE IN THE PLANT.

The SpriteMAX online system produces live web pages containing plant machine status. Our optional real-time data server presents live results in Excel spreadsheets that can be manipulated in a variety of ways to present such calculations as efficiency, power and differential calculations. Our user-format allows you to build custom spreadsheets with plant and machine schematics and color code cells based upon alarm thresholds, diagnostic-fault severity or calculated alarms.



Excel-based mimic displays provide a flexible user interface and powerful formulae and conditional formatting (optional).

An optional system capability uses OLE for Process Control (OPC) outputs which easily adds machine status, fault diagnostics and data to existing plant displays.

And of course, SpriteMAX integrates with DLI's Expert*ALERT*® machine condition assessment software providing extensive tools to manage your plant machinery health.

> > ***Monitoring critical machines in remote locations is no longer a plant maintenance challenge.***

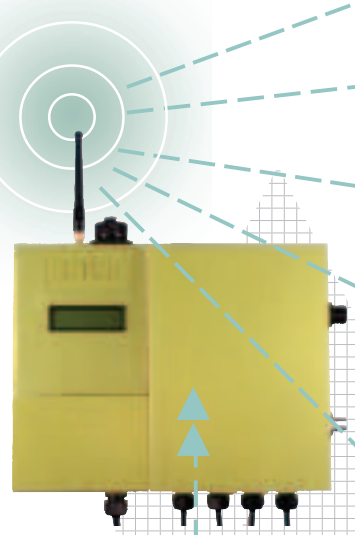
WITH THE POWER OF SpriteMAX, THE ENTIRE ASSESSMENT PROCESS IS CONTAINED AND PERFORMED AT THE MACHINE—DATA IS COLLECTED, PROCESSED AND ANALYZED INSTANTLY.

SpiteMAX generates a wide array of information including concise fault diagnostics and severities and sends results to plant experts or central monitoring activities in near real-time. Raw data becomes available periodically, on demand and—most importantly—when a machine's status changes. When a problem is detected, it is quickly confirmed so machinists can be deployed with proper parts to repair the problem before a catastrophic failure occurs.

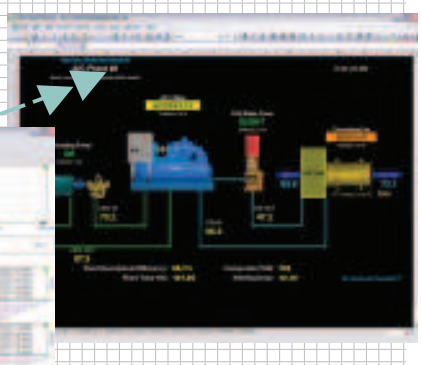
REMOTE MANAGEMENT

SpriteMAX can be remotely controlled and maintained offering plant managers quick response to critical problems. Engineers can trouble-shoot a remote installation, update machine baseline data or test configurations easily through the Internet. As such, SpriteMAX makes an excellent monitoring solution for difficulto-to-access locations such as wind turbines or remote pumping stations.

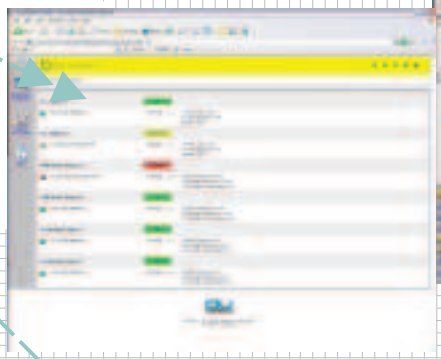
SpriteMAX™ ONLINE SYSTEM



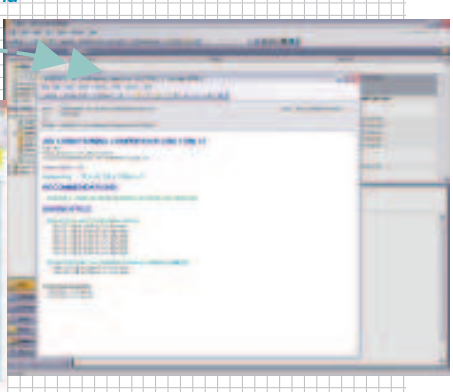
ExpertALERT™
Use DLI ExpertALERT to view and trend data collected by SpriteMAX, configure your online monitoring parameters and produce reports.



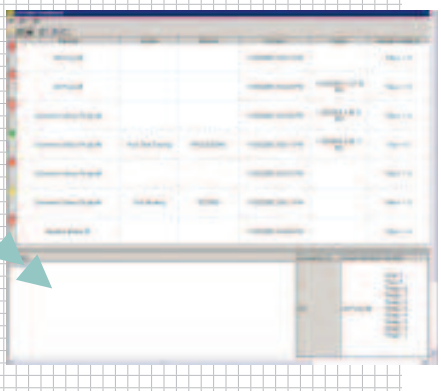
Excel Mimic Display (optional)
Live Excel-based mimic displays provide the user a flexible user interface with the power to apply custom calculations and graphics.



Web Page Interface
Monitor your machines from anywhere with a web browser. SpriteMAX includes tools to move its web pages, mimic displays and XML data from remote locations to your LAN via the Internet.



Automated E-mail Alerts (optional)
SpriteMAX proactively contacts a list of specific users via email when a new fault is identified.



DLI Online Dashboard
Provides a SpriteMAX overview of activity as well as facilitating system set up and troubleshooting.

> > ***Protect plant assets with the most expansive fault detection data base available today.***

EMBEDDED WITH THE SpriteMAX ONLINE SYSTEM IS DLI's ADVANCED, HIGHLY-ACCURATE AUTOMATED DIAGNOSTIC SYSTEM DEFINED BY PATENT #6,298,308.

This exclusive diagnostic system includes over 4,500 individual rules, detects over 950 specific mechanical faults and applies to most common machines such as pumps, motors, blowers, compressors, turbines, gear drives and generators.

The SpriteMAX patented configuration independently monitors the machines and alerts designated individuals when a machine fault is detected.

PARTIAL LIST OF 950 DIAGNOSED FAULTS

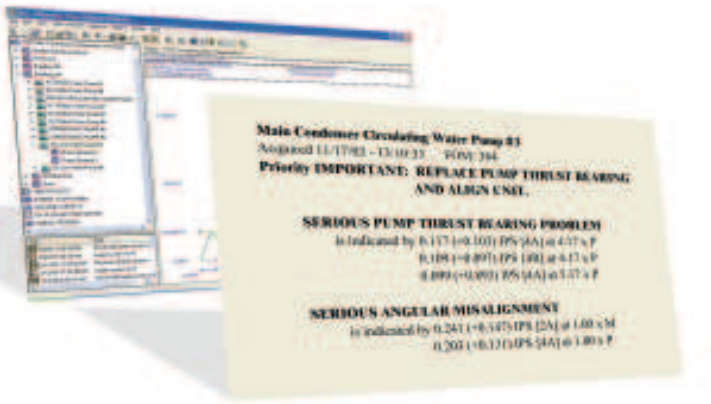
- Accessory Drive Gear Mesh Problem or Wear
- Angular Misalignment
- Attached Oil Pump Internal Wear
- Auxiliary Gear Mesh Problem or Wear
- Bearing Fit Problem
- Bearing Looseness
- Bearing Misalignment or Shaft Runout
- Bearing Wear
- Bent or Warped Shaft
- Blower Lobe Wear
- Blower Rotor Imbalance
- Blower Shaft Ball Bearing Wear
- Camshaft Drive Gear Problem
- Camshaft Problem
- Clutch Imbalance
- Clutch Misalignment
- Clutch Wear
- Compressor Impeller Wear
- Compressor Rotor and/or Idler Wear
- Cooling Fan Problem
- Coupling Wear
- Drive Belt/Chain Irregularity
- Drive Sheave Runout or Wobble
- Exciter Imbalance
- Fan Air Flow Problem
- Fan Blading Problem
- Fan Dirt Buildup or Blading Clearance Problem
- Foundation Flexibility
- Foundation Resonance
- Gearbox Input Shaft Misalignment
- Gearbox Input Shaft Pinion Problem
- Gearbox Oil Pump Gear Mesh Problem or Wear
- Gearbox Oil Pump Internal Wear
- Idler Shaft Looseness
- Imbalance
- Internal Looseness
- Internal Valve Plate Wear or Flow Restriction
- Journal Bearing Clearance Problem (Trapped Fluid)
- Journal Bearing Looseness
- Journal Bearing Oil Whirl
- Line Phase Voltage Imbalance
- Misalignment
- Motor Air Gap Problem
- Motor Stator Lamination Looseness
- Mounting Flexibility
- Mounting Looseness
- Oil Pump Internal Wear or Flow Problem
- Oil Pump Problem
- Oil Pump Shaft Looseness
- Piston Problem or Internal Wear
- Pump Air Ingestion or Flow Problem
- Pump Impeller Wear or Rotor Clearance Problem
- Pump Internal Looseness
- Pump Lobe Wear
- Pump Mounting Flexibility
- Pump Thrust Bearing Problem
- Pump Timing Gear Wear
- Pump Vane Wear
- Reduction Gear Mesh Problem or Wear
- Structural Resonance
- Timing Gear Wear of Mesh Problem
- Turbine Blading or Rotor Clearance Problem

> > Take the guesswork out of confusing data and repetitive alarms with SpriteMAX's automated diagnostic feature.

AUTOMATED DIAGNOSTICS PROVIDE PLANT ENGINEERS WITH ANSWERS NOT JUST DATA.

Unlike most online systems, SpriteMAX has an intelligent diagnostic capacity that distinguishes between critical exceedances in vibration and normal machine operation. The robust processing capacity of this online system collects, analyzes and diagnoses hundreds of machine data sets drastically reducing your engineer's data analysis time and increasing response time.

DLI's automated diagnostic system delivers highly-accurate, fault detection and repair recommendations. Our sophisticated rule-based methodology extends beyond monitoring of simple alarms on peaks or spectral bands. It provides you with an accurate and scientific method for setting machine maintenance priorities and improving plant reliability.



ACTIONABLE INFORMATION

SpriteMAX delivers diagnostic reports complete with fault severities and repair recommendations.

SpriteMAX™ IS THE BEST AVAILABLE SOLUTION FOR ONLINE MONITORING OF ROTATING EQUIPMENT.

Contact your DLI sales representative today or call DLI Engineering for more information about how SpriteMAX can be used to implement machine health monitoring at your facility.

SPECIFICATIONS

System Inputs
- Live dynamic signals
- Narrowband vibration data
- Process data
- OPC process data collected by automation systems
- DDE process data from automation systems, PLCs and remote data acquisition modules
- OSI PI Process Data
- Oceana Systems-System Health Monitor (SHM)

System Outputs
- Machine alarms, automated machine condition analysis & repair recommendations
- Live web content
- Live content presented in Microsoft® Office Excel™ mimic displays
- Automated E-mail alerts
- Integration with DLI ExpertALERT™
- Machine Condition Assessment system OPC server
- XML structured data files via LAN and Internet
- Internet communication of data and results through DLI Web Exchange™

CPU
- NS Geode GX1-300 MHz (low-power) processor
- System memory: 256 / 512 MB SDRAM SODIMM x 1
- Watchdog Timer: Can generate a system reset, IRQ or NMI. (1~ 255 sec, 1 sec/step)
- Operating System: Microsoft Windows® Embedded XP
- Mass Storage: 2 GB CF solid state drive (OS, Programs & Data)

Input / Output
- Networking:
  Ethernet: Realtek RTL8139DL, 10/100Base-T RJ-45
  Wireless: IEEE 802.11b (data transfer rate up to 11 MB/s)
- Com Ports / Peripherals: USB
- Keyboard / Mouse: PS/2

Display
- Integral: 16 x 2 LCD Text Display, System Status
- External Video Adapter: NS CS5530A LCD/CRT controller - 4MB
- Resolution: 1280 x 1024@16bpp (CRT), 1024 x 768@18bpp (TFT LCD)

Signal Processing
- Texas Instruments TMS320C51 Digital Signal Processor (DSP) running @ 40 MHz
- Four 16 Bit delta-sigma A/D converters
- Simultaneous sampling of all four inputs up to 41 KHz
- Anti-aliasing via an analog RC filter plus a 64th order digital FIR filter
- Dynamic range greater than 85 dB
- Signal to noise ratio greater than 76 dB
- Overall RMS amplitude detection from 10 Hz to 1 kHz per ISO 2954-1975(E)

Spectral
- Four channel simultaneous FFT analysis of the analog input channels up to 16 kHz span
- FFT Resolution of: 50, 100, 200, 400, 800, 1600 and 3200, 6400, 12800, 25,600 lines lines
- Spectral Windows: Hanning, Hamming and Uniform
- Averaging Types: Linear, Exponential and Peak-hold continuous
- Overlap processing; selectable overlaps of 0%, 25%, 50% and 75%

Time Domain
- Long time record capture, four channels simultaneous
- Sample rates from 1 Hz to 41 kHz

Analog Inputs
- Four single-ended analog inputs
- 16-512 inputs using optional 4x4 multiplexers.
- Selectable ICP accelerometer sources
- Cable fault detection
- Input signal clipping detection (25 Volts maximum input signal amplitude)
- TTL-level tachometer input

Analog Signal Processing
- Selectable DC coupling or 0.2 Hz or 10 Hz high pass analog filtering
- Selectable single stage analog integration
- No more than -76 dB inter-channel cross talk

Triggering
- Internal:
  Selectable from any analog input channel
  Level, slope
- External:
  TTL trigger, rising or falling edge
  Pre or Post-triggering: 0 to 100% of capture

Environmental
- Fully machined from high grade aluminum
- Max operating temperature: 60°C
- Humidity: 0 to 100% condensing humidity
- Vibration: 15 G RMS (random vibration 0-5000 Hz)

Connections
- Power: 90 - 264 VAC 47-63 Hz
- Network: RJ-45 Ethernet, 802.11b wireless adapter antenna
- Video: SVGA
- Peripherals: USB
- Mouse / Keyboard: PS/2
- 4 Analog data acquisition inputs (input)
- TTL Tachometer (input)
- Multiplexer control (RS-485) (output)

Enclosure
- Sealing: IP-67 (Totally protected against dust and the effects of submersion in water to 1 meter)
- Machined high grade aluminum enclosure
- Dimensions:
  CPU / 8.25"x4.5"x3"
  CPU / Sprite MUX, 8.25"x10"x3"
- Durable powder coated finish

Specifications are subject to change without notice

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