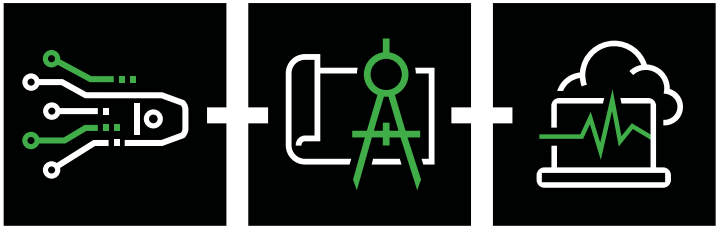
BDI

RAW DATA. REFINED RESULTS.

CORPORATE CAPABILITIES



DATA YOU CAN TRUST

RESULTS YOU CAN BUILD ON

WHO
WE ARE

BDI has been the premier provider of diagnostic testing, structural monitoring, and nondestructive evaluation services around the world since 1989. We have achieved this status by relying on the professional experience and constant advancement of over 50 employees with expertise that ranges from civil/structural engineering, data analysis, electrical engineering, instrument development, and safety.

We also design and manufacture high-quality data acquisition systems and sensors for quantifying structural, geotechnical, and environmental parameters. Our unique combination of data management and instrument development ensures our deliverables are second to none for providing accurate information for engineers to make reliable infrastructure decisions.

With over a thousand successful projects to our credit, our long list of satisfied clients includes state and municipal governments, public and private utilities, A/E firms, and private contractors.

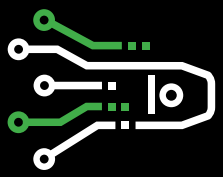
MISSION

We deliver the most reliable results that enable advanced infrastructure evaluation. Our trusted approach revolves around custom-built instruments, skilled engineering and field crews, and intelligent data analysis and presentation.

VISION

To be the definitive answer whenever and wherever civil infrastructure performance is questioned.

WHAT MAKES BDI UNIQUE



INSTRUMENTS

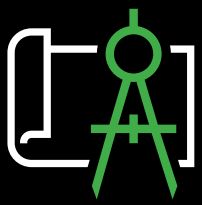
WE RESEARCH AND DEVELOP NEW TECHNOLOGY BASED ON PRACTICAL EXPERIENCE TO STREAMLINE AND ENHANCE RELIABILITY.

OUR WELL-ROUNDED TEAM PROVIDES A WIDE RANGE OF SERVICES TO ANSWER QUESTIONS ON CRITICAL INFRASTRUCTURE PERFORMANCE.

KNOWLEDGE

BDI

RAW DATA. REFINED RESULTS.



SERVICES

ANALYSIS

WE DELIVER QUALITY AND ACTIONABLE INFORMATION THROUGH A TEAM OF ENGINEERS AND DATA SCIENTISTS.

WE DESIGN AND MANUFACTURE OUR OWN INSTRUMENTS, TOOLS, AND PLATFORMS SPECIFICALLY TO MEET INDUSTRY REQUIREMENTS.

WE DEVELOP SIMPLE-TO-USE APPLICATIONS TO ALLOW END-USERS TO EASILY INTERACT WITH DATA.

TECHNOLOGY

WE DEVELOP AND SUPPORT IN-HOUSE SOFTWARE TOOLS WITH IT EXPERTS AND SOFTWARE SPECIALISTS.

DATA MANAGEMENT

T.O.C.

1 | ORGANIZATION

LOCATIONS & FACILITIES

COLORADO (HQ)
Louisville
+1.303.494.3230

ARIZONA
Phoenix
+1.773.820.7333

ILLINOIS
Chicago
+1.773.820.7333

LOUISIANA
Metairie
+1.225.366.9321

NEW YORK
New York City
+1.212.931.0916

NORTH CAROLINA
Raleigh
+1.919.999.3779

PENNSYLVANIA
Horsham
+1.267.448.0080

VIRGINIA
Herndon
+1.540.822.0544

WASHINGTON
Seattle
+1.206.501.3216

In addition to our regional offices, we continue to provide our equipment and services wherever and whenever they are needed in North America and around the world.

If you are located outside the service areas of our satellite offices, please contact our Colorado HQ.


BDI
RAW DATA. REFINED RESULTS.
740 S PIERCE AVE
UNIT 15
BDI

CONTACTS

TESTING & MONITORING SERVICES

Scott P. Aschermann, PE
scotta@bditest.com

Nathan C. Dubbs, PhD, PE, PEng
nathand@bditest.com

Thomas L. Weinmann
tomw@bditest.com

ANALYSIS SERVICES

Jesse D. Sipple, PhD, PE
jesses@bditest.com

Brett C. Commander, PE, PEng
commander@bditest.com

NONDESTRUCTIVE TESTING & EVALUATION

Shane D. Boone, PhD
shaneb@bditest.com

CONTRACTING & ACCOUNTING

Trudee Andersen
trudeea@bditest.com

INSTRUMENTATION & SYSTEMS

Scott P. Aschermann, PE
scotta@bditest.com


Scott Aschermann


Brett Commander


Jesse Sipple


Shane Boone


Nathan Dubbs

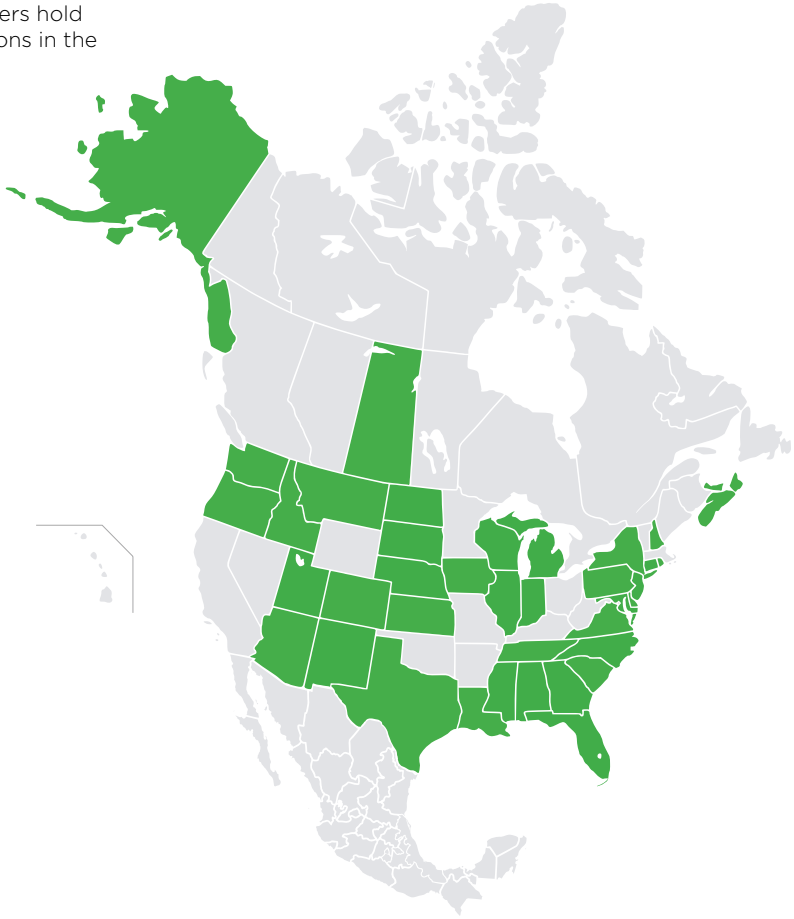

Tom Weinmann


Trudee Anderson

STAFF CERTIFICATIONS & PROFESSIONAL REGISTRATIONS

Our team of civil/structural engineers hold professional engineering registrations in the following provinces and states:

Alabama
Alaska
Arizona
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Indiana
Iowa
Kansas
Louisiana
Maryland
Michigan
Mississippi
Montana
Nebraska
New Jersey
New Hampshire
New Mexico
New York
North Carolina
North Dakota
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Virginia
Washington
Washington, DC
Wisconsin



CANADA

Nova Scotia
Prince Edward Island
Saskatchewan

ASNT Certified Inspectors
SPRAT Certified Rope Technicians
NHI Certified Bridge Inspectors
ATTSA Traffic Control Supervisors
Certified CDL Drivers
ACI-Certified Personnel
Certified UAS Pilots

SECURITY CLEARANCES
Transportation Worker Identification Credential (TWIC)
Secure Worker Access Consortium (SWAC)

2 | CONTRACTING, QUALITY CONTROL, & BUSINESS PRACTICES

ACCOUNTING & TIMEKEEPING

We understand the importance of business systems in relation to project performance; thus, we model our accounting system around the rules and regulations of the Department of Defense. Our comprehensive timekeeping policy ensures that we are in compliance with AASHTO, DCAA, and FAR requirements. Our Timekeeping and Accounting Policies are available upon request.

INSURANCE

We carry the following insurance policies:

+ Commercial General Liability w/Umbrella
+ Professional Liability
+ Worker's Compensation
+ Commercial Automobile
+ Inland Marine (BDI Equipment)
+ International Personnel Coverage
+ Pollution

Upon request, we can issue an ACORD certificate and add clients as additionally insured if required.

GOVERNMENT BUSINESS DESIGNATIONS

SAM Entity Name: Bridge Diagnostics, Inc.

Federal Classification: Small Business

CAGE Code: 1GYL8

DUNS Number: 557400785

GSA Contract ID: GS07F197CA

NAICS Codes:

541330 - Engineering Evaluation Services
541380 - Physical Testing
334419 - Manufacturing Transducers
334513 - System & Sensor Manufacturing
532490 - Equipment Leasing

334515 - Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals

541380 - Testing Laboratories

541715 - Research and Development in the Physical, Engineering, and Life Sciences

611430TTS - Professional and Management Development Training Ancillary

Tax ID: 84-1137406

GSA Schedule
Contract GS07F197CA

SAFETY

We take safety very seriously. During each field test, we develop a site-specific Job Hazard Analysis (JHA) for each site location and perform a "tool box briefing" at the beginning of each work day. To ensure that BDI is complying by the most up-to-date safety protocols, BDI retains the services of a 24-hour on-call safety consultant to supply periodic updates and to discuss any unanticipated hazards so they can assist in rectifying an unsafe working environment.

In addition to ongoing safety awareness training, we schedule routine inspections of our facilities to ensure that our manufacturing operation is OSHA compliant.

BDI field personnel have the following safety training and security credentials:

OSHA 10 Hour – Standard	Hand & Power Tool Safety
OSHA 30 Hour	Railroad – General
OSHA Record Keeping	Aerial Work Platform Safety
Hazardous Communications	Traffic Safety Awareness
Lithium Ion Shipping	CPR
DOT HazMat Shipping	Confined Space Entry
USACE 385-1 & BOR	Competent Person/Equipment Inspector
Fall Protection Awareness	Driving Tests
SPRAT 1	DOT/FMCSA
SPRAT 2	MSHA
SPRAT 3	Anti-Terrorism Awareness
Respiratory Protection	LADOTD Traffic & Flagger
Scaffold Competent Person	

Safety cards and/or credentials for applicable employees are available upon request

BDI is a registered Contractor/Supplier on ISNetworld

PROJECT PLANNING

We have developed and continually update company best practices and standard operating procedures to ensure that we deliver consistent and reliable services across all of our projects and locations. Our vast experience in working directly with engineering consultants, contractors, and owners/agencies has created a breadth of experience in project- or client-specific project management requirements, such as regular progress reports, custom invoicing, schedule look-ahead reports, and most importantly – regular communication with our clients on our progress and any changes in our workplans.

QUALITY MANAGEMENT

Based on our decades of experience we have in the field, we have developed a robust quality management plan that addresses quality control and quality assurance procedures for all major project deliverables. We make it a priority to bring lessons learned into current projects and processes to increase our overall performance quality. Lessons Learned meetings are conducted periodically to constantly improve our expertise and procedures.

BDI's Quality Management Program is available upon request.

SUBCONTRACTING

In some cases, we may be a project prime contractor and require the assistance of subconsultants and/or subcontractors to complete the work.

Any work being performed by firms hired as a subconsultant by BDI are held to the same exceptionally-high standards as those adhered to by BDI.

LOGISTICS

BDI has remote offices around the country and can mobilize to provide all services from any location. This allows us to provide faster response times and lower mobilization fees. We will also mobilize to your location in the most efficient way possible, and we can arrange emergency response within 24-hours if necessary. We also have fully-equipped mobile testing labs for larger field installations.

3 | SERVICES

BDI offers a broad range of testing and monitoring services that fall into the following categories:

01 DIAGNOSTIC TESTING & ANALYSIS

Diagnostic testing refers to a relatively short-term field test in which instrumentation is installed on a structure, data is collected under live load with our STS4 system, and then the instrumentation is removed. The resulting data can be used to verify the client's analysis or for calibrating a finite element model for determining accurate load ratings. BDI began pioneering the efficient diagnostic testing approach in the late 1980s for highway bridges and have since adapted it for use in hundreds of other infrastructure applications.

Our services have since been broadened to also include tests such as:

+ Cable force analysis using accelerometers for cable-supported structures
+ Hydraulic structures testing
+ Movable structure balance testing

02 INFRASTRUCTURE MONITORING

One common application referred to as Structural Health Monitoring involves automatically recording data in the field for days, months, and years. There are hundreds of variations of these systems depending on sensor types and locations, whether or not there is power available at the site, type of cable routing (such as in conduit), and many other variables. Data is periodically downloaded via cellular network and reviewed to ensure high quality.

03 NONDESTRUCTIVE EVALUATION (NDE)

NDE focuses on the testing of existing steel, concrete, timber, or other structural elements to determine their in-situ condition. Depending on the application, a large range of technologies are available that can be utilized alone or in combination, including:

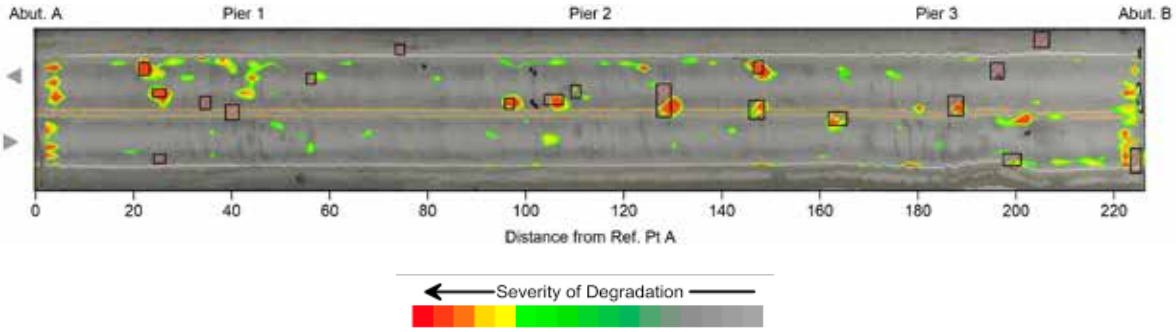
- 3D-Radar GPR
- Impact Echo (IE)
- Impulse Response
- Infrared Thermography (IR)
- High-speed Bridge Deck Inspection:
  - GPR/IR/HRV
  - Deck Acoustic Response (SounDAR)
- Electrochemical Testing
- Sonic Echo/Impulse Response (SE/IR) for Unknown Foundations
- Ultra and Parallel Seismic Testing for Unknown Foundations
- Material Sampling and Testing
- ASNT Steel Inspections – VT, PT, MT, ET, UT, PAUT
- Unmanned Aerial Vehicle (UAV) Inspection

SOUNDAR

BDI's Deck Acoustic Response (DAR) system provides an automated & innovative method of performing sounding of bridge decks. The DAR method is used to identify and quantify areas of subsurface degradation including delamination, debonding, and spalling. Typical acoustic methods use a low strain stress wave and are used to interrogate the integrity of concrete structures. This includes a variety of methods including traditional methods such as hammer sounding and chain drag as well as nondestructive techniques such as impulse response and impact echo. The DAR method utilizes a combination of these techniques along with a novel analysis technique to accurately identify the location and size of flaws in concrete bridge decks and other structural concrete structures.

THE AUTOMATED SYSTEM ALLOWS FOR BRIDGE DECK TESTING IN A FRACTION OF THE TIME TYPICALLY REQUIRED BY CHAIN DRAG

RESULTS PRODUCED (SHOWN IN BOXES BELOW) REFLECT THOSE TYPICALLY ACHIEVED BY CHAIN DRAG AND THE HUMAN EAR



SECTORS

BRIDGES

BDI began pioneering accurate highway bridge evaluations in the late 1980's by collecting field data for creating analytical models. Since then, we have solidified our industry-leading expertise by developing and manufacturing our own structural testing systems. Using our vast experience in data collection, analytical modeling, and hardware development, we can provide all levels of highway and railroad bridge evaluation services including:

+ Developing instrumentation and testing plans
+ Qualitative data review, finite element modeling & calibration
+ Recording responses to live loads & temperature variations
+ Accurate AASHTO Load Ratings (LRF/LRFD) for highway bridges
+ Accurate AREMA load ratings for design loads and heavier rolling stock
+ Permit Load Verification
+ Determining bridge deck conditions
+ Structural dynamic performance
+ Movable structure performance testing and/or monitoring
+ Pier, abutment, and other foundation movements
+ In-situ stress analysis
+ Investigate effects of damage or proposed repairs
+ Phased Approach to Bridge Deck Evaluation utilizing High Speed Scanning and SounDAR

BRIDGE DECK EVALUATION

BDI specializes in providing NDE investigation and subsequent bridge deck condition analysis and monitoring of components to owners such that they can better manage their assets. Particularly with reinforced concrete, BDI has implemented a multi-phase approach to inspection that provides the owner with data that can be utilized to determine the life cycle of the structure and appropriate times for maintenance, preservation, and repair or replacement. This multi-phase technology using the following methods is typically analyzed to report the corresponding metrics:

GPR 3D Radar
CONCRETE DEGRADATION, PRECURSORS TO DELAMINATION, AND CONCRETE COVER OVER THE TOP REBAR

IR
SHALLOW DELAMINATIONS

HRV
SPALLING, PATCHING, AND SEVERE CRACKING

SounDAR
DELAMINATIONS AND CONCRETE DEGRADATION

ER HCP
ELECTROCHEMICAL – PROBABILITY OF CORROSION

SHALLOW DELAMINATION, OVERLAY DEBONDIN, SPALLING, AND PATCHING

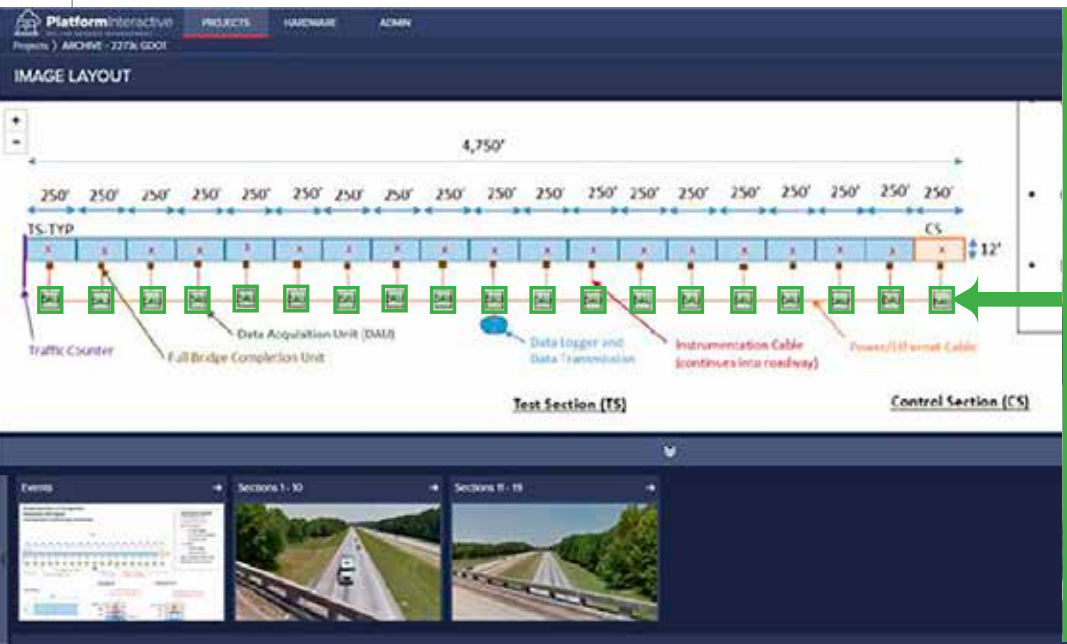
PAVEMENT

BDI provides instrumentation and services for pavement performance evaluation by providing sensors, monitoring systems and nondestructive evaluation services to help understand pavement performance and under lying support conditions. This service is provided to Accelerated Pavement Test (APT) facilities, construction road and airport projects and in-service roads where existing conditions may need repairs and/or rehabilitation.

Our pavement group integrates BDI's Structural Testing System (STS) and Structural Monitoring System (SMS) to evaluate pavement performance utilizing specialized sensors and data acquisition components for Accelerated Pavement Test (APT) facilities, road construction, airport projects, and in-service roads across the US and around the world. Our pavement sensors include:

+ Asphalt Strain Gages,
+ Concrete Strain Gages,
+ Soil Compression Sensors,
+ Earth Pressure Cells,
+ Soil Moisture,
+ Multi-Depth Deflectometer,
+ Thermal Gradient,
+ Geogrid Strain, and
+ Custom solutions to meet your specific needs.

Data is posted to BDI's web-based data management system for data storage and visualization. Sensor based triggers can be set up for data collection and/or camera image capture of vehicle passage.



Utilizing continuous wave step frequency with 3D Radar GPR, our pavement division now offers additional capabilities to evaluate new and existing pavement condition allowing for improved pavement layer thickness data to be collected and analyzed. The data can be used to calculate the FWD and TSD pavement stiffness property. This GPR can be used to identify defects such as voids under rigid pavement. With integrated coring and other testing capabilities, our pavement NDE division offers comprehensive solutions.

Finally, BDI offers Unmanned Aerial Vehicle (UAV/drone) services for pavement assessment and monitoring. Available drone-mounted technologies include:

+ High Resolution Imaging (HRI),
+ Infrared Thermography (IRT)
+ LIDAR (including Simultaneous Localization and Mapping)

HYDRAULIC STRUCTURES

During the refinement of our bridge testing methods, we've adapted our techniques and hardware for use in evaluating hundreds of water control structures on major rivers for issues such as:

+ Tainter gate trunnion friction evaluation
+ Miter gate opening, closing, and hydraulic forces
+ Cable force balancing for lift gates
+ Welded connection inspection and evaluation
+ Counterweight balancing and cable tension measurements on lift structures
+ Structural evaluations of all types of gates & valves
+ Measure gudgeon and diagonal forces in miter gates
+ Evaluate hoist forces and interference issues
+ Mechanical drive system forces including:
  - Torque on pinion shafts
  - Strain/stresses on gear teeth
  - Cable force measurements
  - Amperage draw on drive motors
  - Operating forces in drive systems
  - Hydraulic oil operating pressures
+ Geomatic monitoring
  - Automated Total Statistics
  - GNSS (GPS)

MARINE

Using the combination of our bridge and river control structure evaluations, we have adapted our techniques into quantifying:

+ Seawall movements
+ Ferry bridge evaluations
+ Sheet pile forces
+ Impacts

25
SERVICES

ENVIRONMENTAL

We've complimented our structural and geotechnical capabilities with a wide variety of environmental monitoring services for tracking:

- Windspeed/direction, temperature, humidity
- Air quality
- Hazardous compounds
- Air modeling & permitting
- Water quality

BUILDINGS

We have modified our testing and monitoring services for evaluating all types of building issues including:

- ASTM floor & column load tests
- Foundation settlements
- Crack growth monitoring
- Seismic movements
- Vibration monitoring
- Wind speed monitoring
- Geomatic monitoring
  - Automated Total Stations
  - GNSS (GPS)

STRAIN GAGE SERVICES

BDI provides high-quality instrumentation services and equipment all over the world. Since the inception of BDI, one of the core competencies has been strain measurements. This started off with building our our own fully active Wheatstone bridge strain transducer to developing a variety of Wheatstone bridge completion modules for rugged field applications. With this in-house experience we now offer strain gage installation as a service for those clients that either need to have a custom component turned into a strain sensor or by sending our team of highly qualified technicians to install strain gages at our clients facilities.

AT CLIENT'S FACILITY
BDI GAGE INSTALLATION

Our ITAR-cleared technicians can mobilize to your facility, work during the prescribed schedules, and follow detailed client installation procedures so that your time-sensitive delivery schedules can be maintained.

AT BDI'S LABORATORY
CLIENT'S OEM GAGE INSTALLATION

BDI has a full range of preparation and gage installation equipment for mounting foil gages including ultrasonic water baths, media blasters, programmable curing ovens, soldering microscopes, programmable environmental chambers, and quad-zone vacuum-operated gage bonding systems.

CONSTRUCTION

We can assist with an endless number of monitoring applications for civil structure construction phases which include:

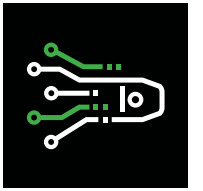
- QA/QC verification
- Concrete curing temperatures
- Measure cable forces to assist crews with field adjustments
- Transportation loads while hauling structural members
- Wall or foundation movements during rehabilitation work
- Concrete coring of bridge decks
- Vibration monitoring
- Structural element forces during installation
- Demolition forces
- Slope stability, pore water pressure, and gross soil movements
- Geomatic monitoring for settlement
  - Automated Total Stations
  - GNSS (GPS)

GEOTECHNICAL

A natural extension of our service line has been the inclusion of a large number of geotechnical data collection applications including:

- Geomatic monitoring
  - Automated Total Statistics
  - GNSS (GPS)
- Roadway pavement evaluations
- Slope stability and pore water pressure tracking
- Settlement monitoring
- Rockfall
- Geostructural interaction
- Static pile load testing
- Vibration

4 | INSTRUMENTS



BDI instruments provide the foundation for virtually all testing, monitoring, and NDE projects. In order to remain at the forefront in this industry, we have continuously developed, manufactured, and refined our own line of sensors and data acquisition systems since 1989.

Because we've trudged through the mud, rappelled from ropes, and swayed in bucket trucks—all in bad weather—we know that ease-of-use is a must. Therefore, all our hardware is easy to install and the software is simple to operate. Simplicity allows our clients to focus on collecting data rather than worry about programming or wiring.

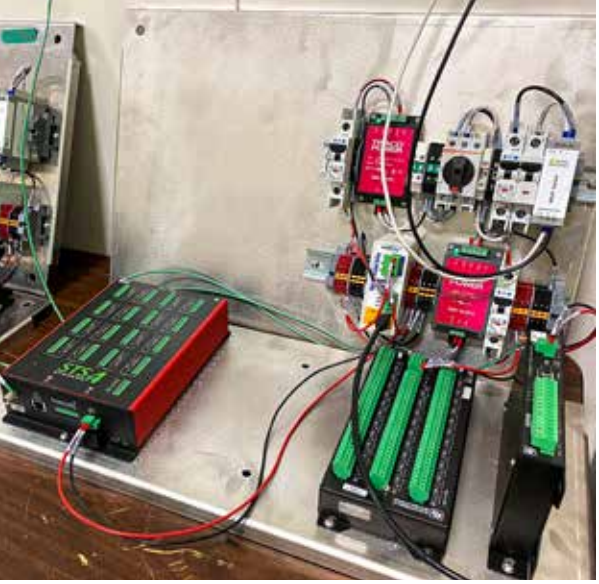
In addition to our own equipment development and manufacturing, we are value-added resellers for several partners that complement our own products and services.

INSTRUMENTS RESOURCES

In order to support our service operations, BDI keeps over 500 channels of its STS data acquisition systems available on hand for deployment to field testing/monitoring projects. We also have hundreds of sensors including strain transducers, LVDTs, string pots, accelerometers, tiltmeters, and ultrasonic displacement sensors ready for immediate mobilization.

We have a 11,500 sqft production facility at our Colorado HQ that has been built to manufacture, test, and calibrate the instruments that we produce along with the third party sensors and systems that we integrate into our turn key testing and monitoring systems. Some of the key features of our manufacturing facility include:

+ Dedicated production workstations, with full ESD protection
+ Calibration clean room with N.I.S.T. traceable calibration stations
+ Environmental Chambers for thermal testing
+ Positive pressure clean room for strain gage installation
+ Systems integration and testing room
+ Inventory control room
+ Loading dock for large shipments
+ In-house QA/QC program
+ Made in USA




BDI ASTCS

Our team uses many tools for the design, development, and testing of our data acquisition systems and sensors, including:

+ Altium™ design software for designing and laying out electronic circuit boards
+ LabView™ development software for programming and testing our testing systems
+ SolidWorks™ software for mechanical design of housings
+ MATLAB mathematical function solving software used for many subroutines
+ In-house custom-designed NIST traceable sensor calibrators
+ High-quality digital oscilloscopes, 5-digit voltmeters, and soldering stations
+ Programmable environmental chamber for temperature characterization

To keep quality high, BDI systems and sensors are constantly undergoing updating and refinements.

1,200 DATA ACQUISITION CHANNELS

1,500 SENSORS

READY TO DEPLOY

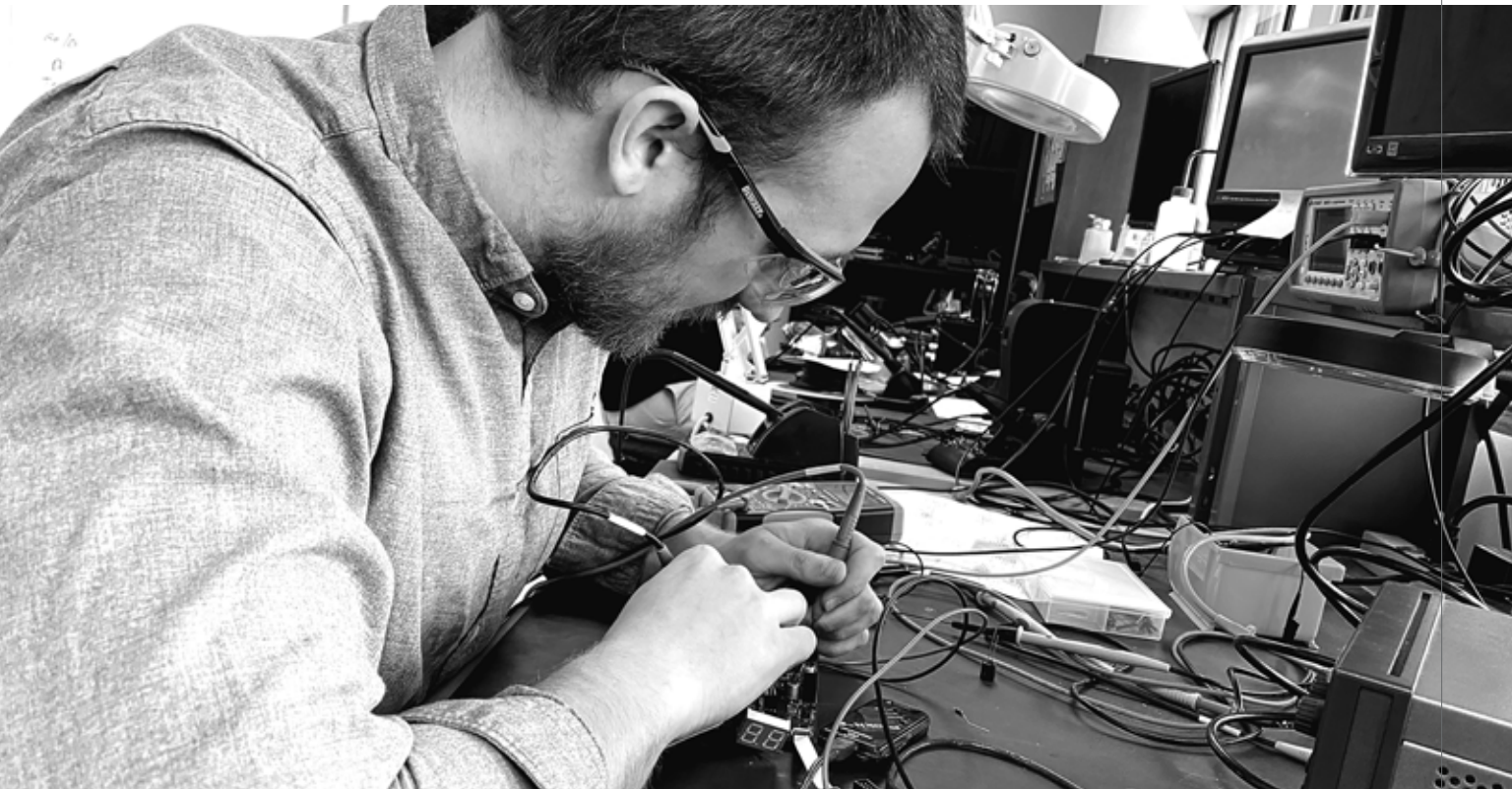
RESEARCH & DEVELOPMENT

BDI quickly learned that specialized data acquisition equipment would be required to provide efficient testing and monitoring services. Therefore, we have been engaged in research and development of electronics, firmware, and software since the late 1980s.

The equipment that we have developed and updated over the years include:

+ Structural Testing System: Rugged wireless data acquisition system for load testing
+ Structural Monitoring System: Cost effective monitoring systems ranging from ultra-low power, slow sample speeds to high speed dynamic logging
+ Contract Strain Gage: Fit-for-purpose sensor designs for various project-specific applications
+ Sensors: Custom, rugged sensors that can be used in a lab or the harshest environments
+ SounDAR: Deck Acoustic Response for evaluating large concrete & pavement surfaces
+ Custom Solutions: With our in-house R&D team, we often develop custom solutions for our projects, as well as our clients' projects

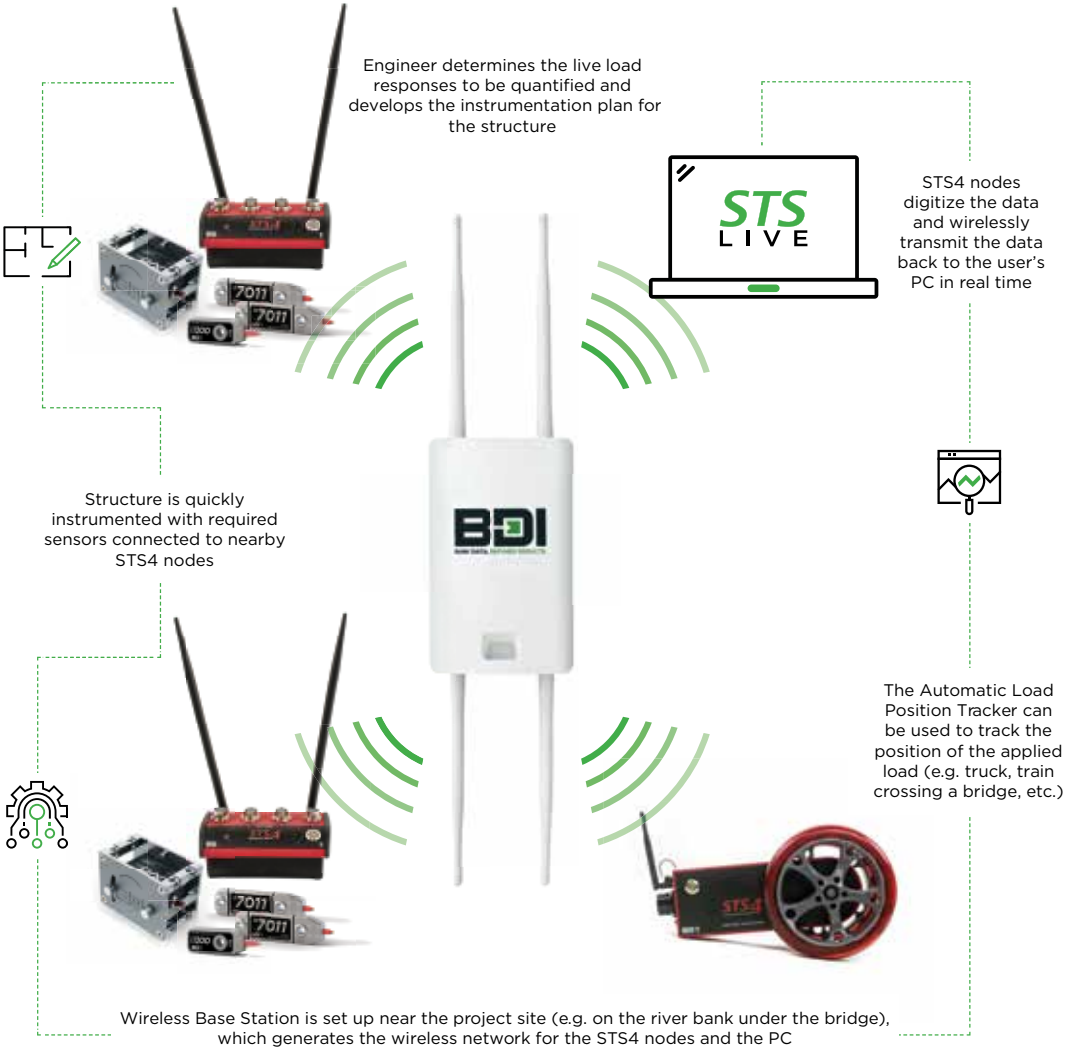
BDI STAFFS A MULTI-DISCIPLINARY TEAM OF ENGINEERS THAT ARE CHARGED WITH THE DEVELOPMENT OF NEW PRODUCTS, AS WELL AS CONTINUALLY IMPROVING OUR EXISTING PRODUCTS.



STRUCTURAL TESTING SYSTEM

In the late 1980s, University of Colorado researchers performed diagnostic load testing during a nationwide bridge evaluation program which led to the development of a rugged and efficient data acquisition system. This unique Structural Testing System (STS) allows our teams and clients to load test a typical structure in one day! Since then, BDI has been constantly upgrading and refining the hardware, software, and testing procedures. Consequently, our latest version, the STS4, has approximately 30 years of testing experience built into its operation and has been adapted for use on all types of structures.

HOW IT WORKS


Engineer determines the live load responses to be quantified and develops the instrumentation plan for the structure
STS LIVE
STS4 nodes digitize the data and wirelessly transmit the data back to the user's PC in real time
Structure is quickly instrumented with required sensors connected to nearby STS4 nodes
BDI
The Automatic Load Position Tracker can be used to track the position of the applied load (e.g. truck, train crossing a bridge, etc.)
Wireless Base Station is set up near the project site (e.g. on the river bank under the bridge), which generates the wireless network for the STS4 nodes and the PC

STS4 UNIQUE FEATURES

+ Plug and play wireless data acquisition system
+ Li-Ion Battery Powered
+ Distributed DAQ
  - Minimize cable
  - Smart (Intelliducer) sensors
  - Scalable to meet large project needs
+ Rugged, weatherproof design
+ Flexible to accommodate most sensors on the market
+ Integrated Load Position Tracker
+ Simple, yet powerful data collection software (STS-LIVE)

INTELLIDUCER

Every BDI sensor is supplied with a customized “Intelligent” connector that stores relevant information such as its name and calibration factor. The result of this feature is that rather than attempting to track channel numbers during the instrumentation process, the only information that the field crew needs to record in the notes is the sensor name and its location on the structure. This feature dramatically reduces the potential for making mistakes in the field under hectic conditions.

4-CHANNEL INTELLIDUCER NODE

Battery-powered, wireless, and water-resistant with 40 hours of data collection time make these rugged nodes ideal for all diagnostic testing applications. Intelliducer connectors simplify the installation by automatically applying all sensor settings and can be used with the full range of BDI sensors, in addition to most analog sensor types.

WIRELESS BASE STATION

This battery-powered unit generates the wireless communication link between the computer and all STS4 nodes.

AUTOMATIC LOAD POSITION TRACKER

Designed specifically for load testing bridges, this device wirelessly tracks the longitudinal position of the loading vehicle during the test so that data can be viewed as a function of load position rather than time.

STRAIN TRANSDUCER

The ST350 Strain Transducer has been designed for structural testing in tough field conditions. These accurate, rugged, and fully weatherproofed units can be installed very quickly for all types of measurement applications.

STRUCTURAL MONITORING SYSTEM

Based on our successful STS4 architecture, we have developed a modular Structural Monitoring System that can be applied in laboratory research projects or large-scale, high-speed, permanent monitoring systems. We've once again taken the lessons learned over hundreds of monitoring projects and put them into the design of our hardware. With simple power and communication options coupled with easy-to-configure software, our systems can be designed and installed more efficiently than anything else on the market.

SMS DIAGRAM

PLATFORM INTERACTIVE DATA HOSTING

Data hosting through Microsoft® Azure that allows:

+ Simple and secure data measurement
+ 24/7 staffed service center
+ Custom alerts and notifications
+ Advanced graphing options

DATA TRANSFER

+ **STS-SYNC:** Microsoft® Windows® application to collect data on a defined schedule.
+ **Client Servers:** The Core Data Logger can be configured to push data to a client designated server.

SETUP/CONFIGURATION

+ **STS-MONITOR** is used for configuring the system, either remotely or through direct on-site connection.
+ Systems can be preconfigured by BDI or by the Client.

POWER

Many solutions are available depending on site requirements:

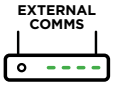
+ 90-220 VAC line input
+ Wide range of solar power options
+ UPS battery backup system
+ Remotely monitor the power system with email/SMS alerts directly from the Core Data Logger in the event of a power failure.

PlatformInteractive
ONLINE SENSOR MANAGEMENT

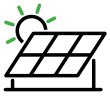
EXTERNAL COMMS

Data transfer from the Core Data Logger to an off-site location can be accomplished by:

+ Hard line communication link
+ Cellular modem
+ Satellite modem



100-240 VAC POWER



SOLAR POWER

EXTERNAL POWER SOURCE

THIRD PARTY HARDWARE/SENSORS

BDI recognized the need to integrate key components that are manufactured by third party vendors so that we can supply a complete system and continue to expand our capability.

+ Vibrating wire sensor interface
+ Environmental sensors
+ Digital cameras
+ Digital sensors
+ Ask us to integrate your sensors!

3RD PARTY HARDWARE SENSORS

OR

CORE DATA LOGGER

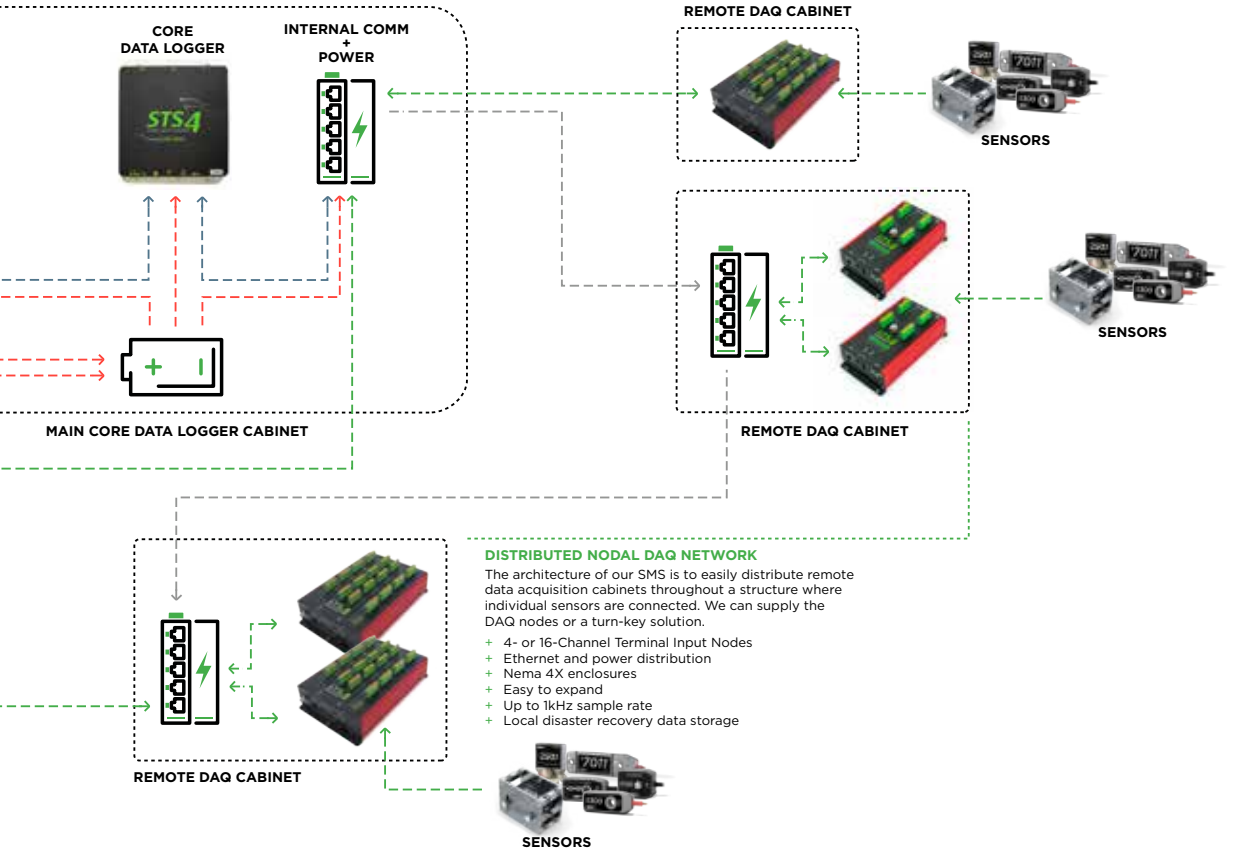
Our industrial-rated Core Data Logger is the essential component that collects, processes, and stores the data from the distributed DAQ nodes.

+ Solid state hard drive
+ Dual network ports
+ Data processing
+ Custom alerts

INTERNAL COMMS & POWER

The communication backbone is standard TCP/IP and the power distribution is 24/48 Vdc. To support this design, we supply the following components:

+ Industrial Ethernet switches
  - Passive Power over Ethernet injection
+ Industrial Ethernet cable
+ Armored Ethernet & power cable
+ Wireless point-to-point comms



DISTRIBUTED NODAL DAQ NETWORK

The architecture of our SMS is to easily distribute remote data acquisition cabinets throughout a structure where individual sensors are connected. We can supply the DAQ nodes or a turn-key solution.

+ 4- or 16-Channel Terminal Input Nodes
+ Ethernet and power distribution
+ Nema 4X enclosures
+ Easy to expand
+ Up to 1kHz sample rate
+ Local disaster recovery data storage

4- OR 16-CHANNEL TERMINAL NODES

The economical terminal input nodes have been designed for both laboratory and long-term monitoring applications. Either 4 or 16 analog sensor inputs alongside an equal number of thermistor inputs make these nodes ideal for collecting high-speed data and correcting for temperature at the same time.

CORE DATA LOGGER

This rugged customized industrial computer is designed to collect and process data from our nodes in the harshest of environments. Proven to provide continuous reliable data collection, the CDL can process and store over 100 GB of data and transmit the data to the cloud or an office server/computer.

MONITORING ACCESSORIES

From full system design to an extensive array of options, we have you covered.

+ Solar/AC battery backed power systems
+ Enclosures
+ Power/Communication cables
+ Wireless communication
+ Third party sensors/systems integration
+ Cellular/Satellite/Hard Line communications
+ Many more, please inquire

SENSORS

ACCELEROMETER

The A1521 & A2521 Accelerometers have been designed for dynamic structural testing in tough field conditions. These accurate, rugged, and fully-weatherproofed units can be installed very quickly and are available in ranges between 2g and 100g.

TILTMETER

The T500 electrolytic tilt sensor is a high precision sensor with integrated mechanical offset adjustment, designed for short-term testing applications. The T600 MEMS tilt sensors are ideal for longer term installations due to their temperature stability.

STRAIN GAGE COMPLETION MODULE

Available in both 120Ω and 350Ω configurations, as well as standard or amplified outputs, these rugged and re-usable Strain Gage Completion Modules significantly reduce field installation time since only the lead wires from either a ¼-arm or ½-bridge foil gages are connected with a waterproof connector.

DISPLACEMENT SENSOR

LVDTs are spring-loaded units that provide the “gold standard” for structural deflections when scaffolding or another reliable reference is available. In addition to LVDTs , we offer cable potentiometers, resistive displacement transducers, and ultrasonic displacement sensors.

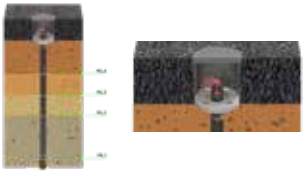
PAVEMENT SENSORS

ASPHALT STRAIN TRANSDUCERS

Asphalt Strain transducers (ASt/VASt) measure axial strain in flexible pavement under high frequency (dynamic) conditions. These low modulus, ruggedized sensors are built to withstand the high temperature and vibratory rolled compaction required for asphalt placement.

CONCRETE EMBEDMENT STRAIN TRANSDUCER

Concrete Embedment Strain Transducers (EST) measure axial strain in rigid pavement under long-term static (slab curling) or high-frequency dynamic (pavement response to trafficking) conditions. These ruggedized sensors are built to withstand the harsh conditions of concrete placement and vibration.



MULTI-DEPTH DEFELCTOMETER

Multi-Depth Deflectometers (MDD) are used to measure in-situ elastic deformation and/or permanent deformations in the various pavement layers of a test section. The BDI MDD system is a series of parallel rods in a 50- or 75-mm diameter hole in the test section. The parallel rods are anchored at various depths inside the MDD tube wall.

SOIL COMPRESSION GAGE

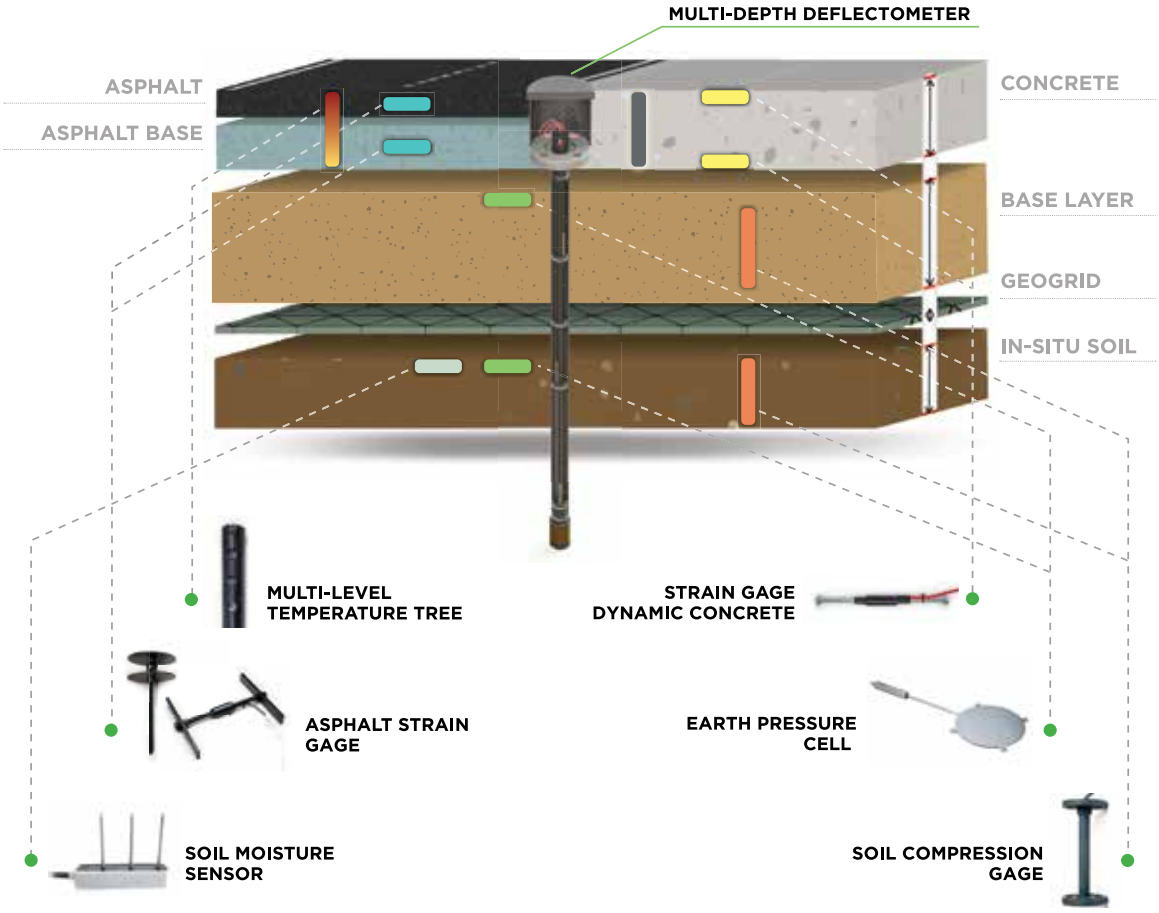
Soil Compression Gages (SCG) measure horizontal or vertical displacements in soils or subgrade material. SCGs are ruggedized to withstand the harsh environment in soils and construction fill material during placement and compaction.

TEMPERATURE TREE

Temperature trees are used to determine thermal gradients that can affect flexural strains and material stiffness. By providing fixed spacing of the thermal measurements in specific layers in pavements and soils help to better model pavement-soil interaction and/or effects from thermal differences of pavement surfaces.

PAVEMENT MONITORING

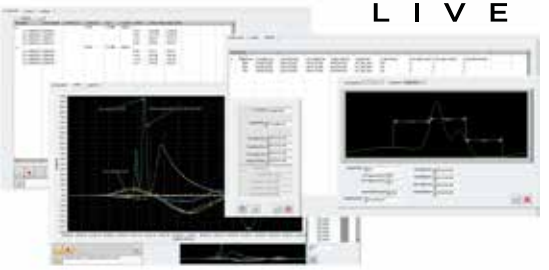
With pavement instrumentation placed during construction and utilizing BDI's high-speed data acquisition units, trackside/roadside data collection is simplified. These units collect data at up to 1000Hz and are interconnected with Power over Ethernet (PoE) to provide power to all units from one centralized location.



DATA COLLECTION & PROCESSING SOFTWARE

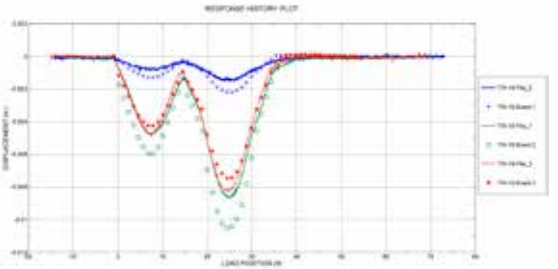
STS-LIVE

No programming required! You mount the sensors on your structure, connect them to a local STS4 node, turn the system on, and start testing. Export data directly into STS-VIEW or open directly with Microsoft Excel.



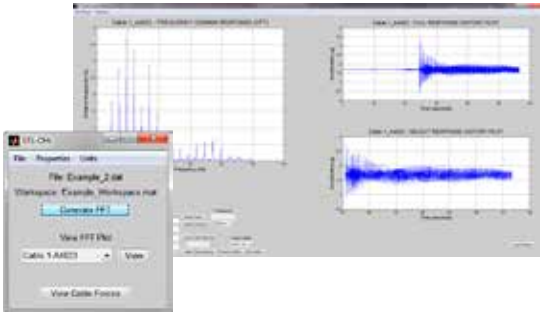
STS-VIEW

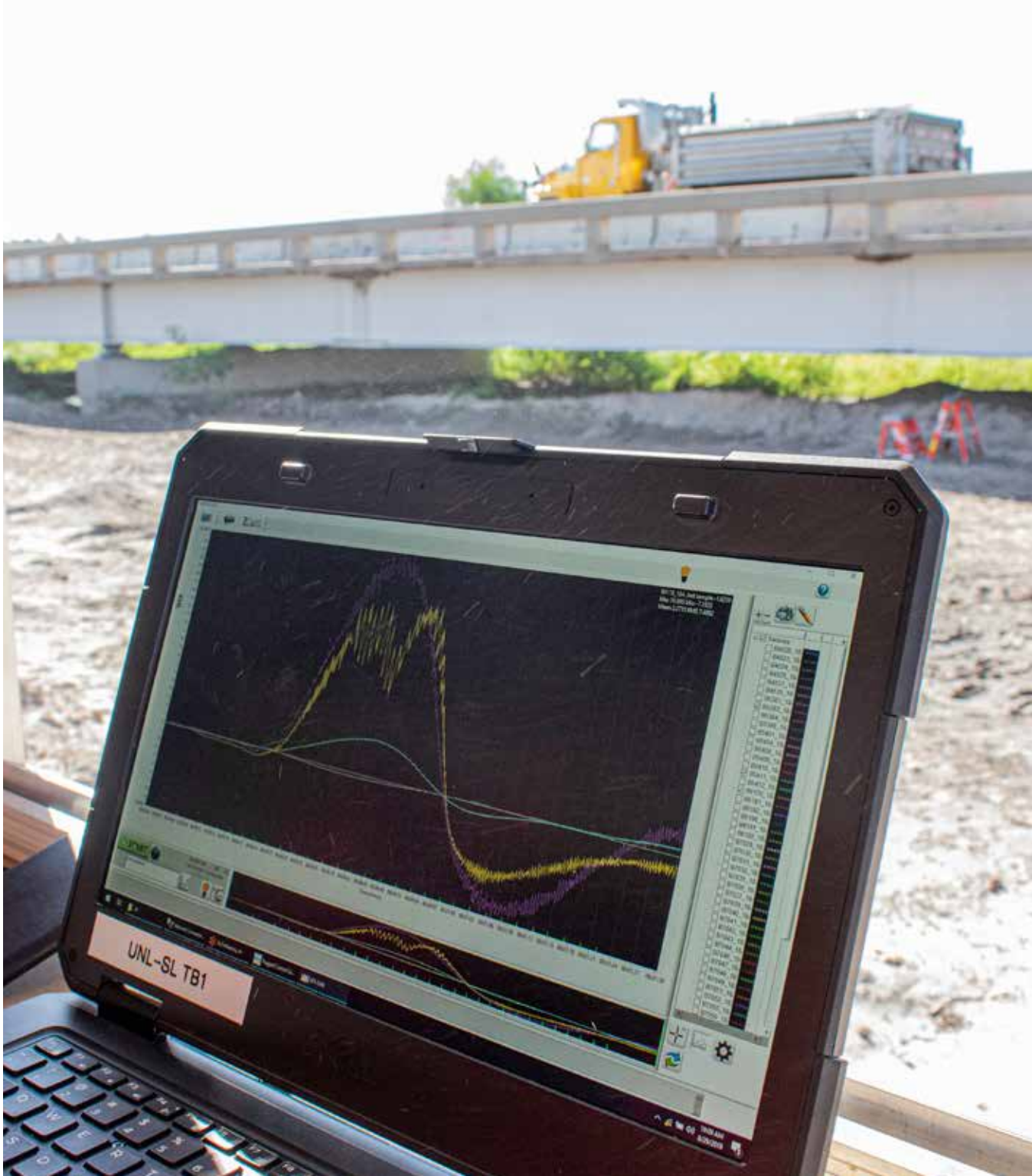
A graphing application designed for viewing and processing data collected by our STS data acquisition hardware as well as Campbell Scientific data loggers. Quickly interpret the structure's response by viewing data as a function of time, load position, or load event. Apply filters, overlay finite element data, and view the frequency response. This application greatly reduces data processing time!

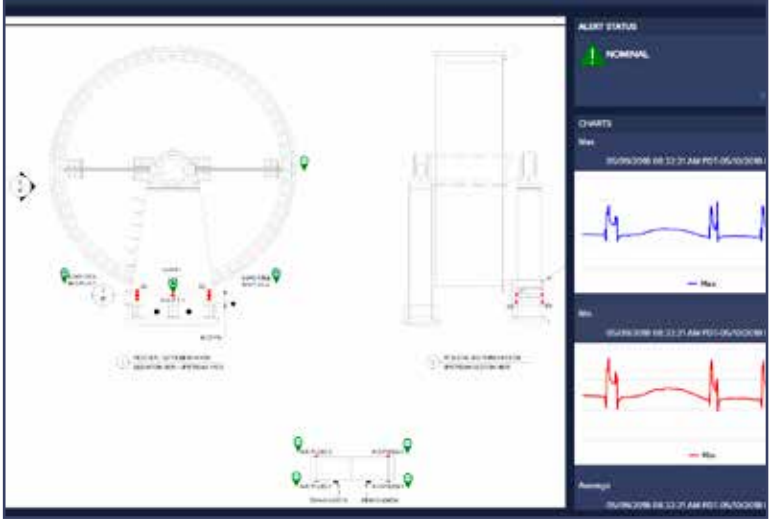


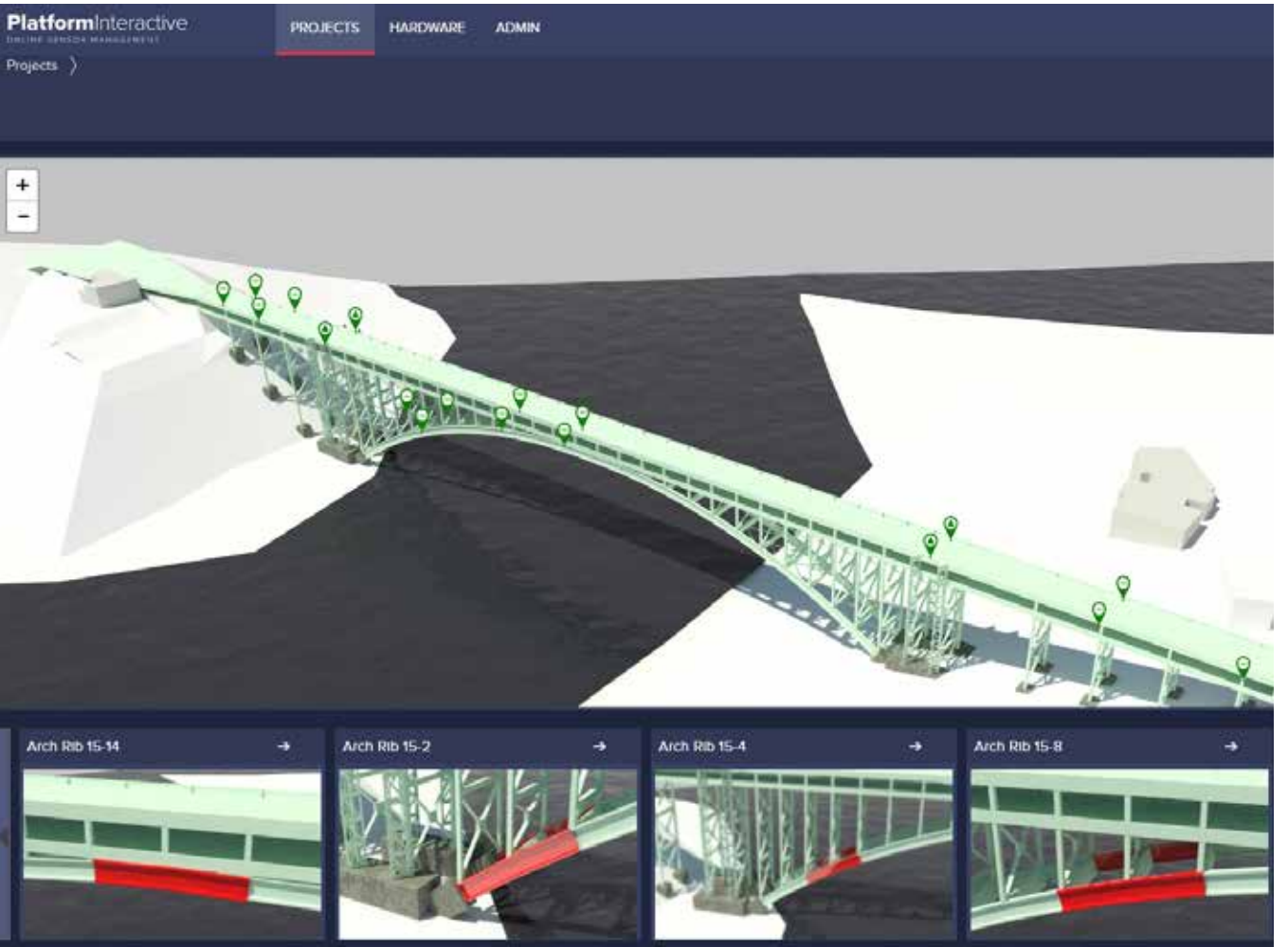
STS-CFA

The STS-CFA application computes in-situ cable forces using acceleration measurements collected by our STS data acquisition hardware. Run side-by-side with STS-LIVE and forces can be computed simultaneously for up to 12 cables and displayed immediately so that adjustments can be made more efficiently than measuring one cable at a time.




UNL-SL TB1


ALERT STATUS
NOMINAL
CHARTS


PlatformInteractive
PROJECTS
HARDWARE
ADMIN
Projects
Arch Rib 15-14
Arch Rib 15-2
Arch Rib 15-4
Arch Rib 15-8

5 | DATA MANAGEMENT

PlatformInteractive
ONLINE SENSOR MANAGEMENT

We offer a cloud-based database management services called Platform Interactive for all field monitoring and data hosting requirements. It is highly secure, simple to use, and can be configured for virtually all field data monitoring applications.

+ Monitor an unlimited number of sensors
+ Several alert types such as emails and texts
+ Near real time data presentation using advanced graphics engine
+ Assemble and organize data from multiple data sources
+ Easily input manually collected data
+ Custom reporting tools
+ Based on industry-leading computing platform-Microsoft® Azure cloud
+ Utilize and configure for your existing data acquisition systems
+ BDI data hosting service is backed with a 24/7 quality monitoring guarantee

Platform Interactive utilizes Azure, Microsoft's industry leading cloud computing platform with over $15 billion of data center investment. To ensure security, privacy, and compliance, Microsoft employs robust policies and processes, and openly shares the results of third-party audits that review the effectiveness of their internal controls. Our hosting service is also backed with a 24/7 manned control center which ensures the highest level of customer support.

Microsoft Azure

Microsoft Azure Compliance & Certifications:

ISO 27001
SOC 1
SOC 2
FedRAMP
UK G-Cloud
PCI DSS
HIPAA

+ MONITOR

All monitoring systems are supported by 24 / 7 technical support and are regularly reviewed to verify that system power, external communications, and data presentation are uninterrupted. Around the clock engineering support is also available upon request for critical monitoring needs. Our ongoing monitoring team is also the first line of defense for receiving and validating alerts, from a measurement perspective, issued by the monitoring system.

+ REPORT

While our Platform Interactive web service provides data in a near real-time fashion and manages all automated alerts, end users often want a physical documentation of a monitoring system's measurement that will survive as part of the project records well after the scope of work is completed and the website is decommissioned. To facilitate these requests, BDI prepares on-demand or recurring reports, as appropriate, that document the performance of the monitoring system itself (uptime, sensor status, alert status) as well as displays the timehistories of interest over the reporting period. These reports can be tailored to the project needs and our engineering team can also perform data analysis and data processing services upon request.

+ ALERT

It is impractical to expect end users to watch a website 24/7 to identify possible issues with their structure. Instead, BDI works with our clients to design and implement automated alerts based on current measurements or trends. Multiple levels of alerts can be defined concurrently that send notifications to various groups of recipients, allowing for a hierarchy of alert priorities and distribution lists. These are most appropriate for projects where low-level threshold exceedances are sent to engineers or data reviewers to receive, validate, and confirm an alert before transmitting the findings to others. In other cases, mission critical alerts are sent to all interested parties immediately for review and action.

+ CUSTOM SOLUTIONS

The structures we work on are unique, and so are the instrumentation and monitoring approaches we implement! As such, we have the abilities to develop custom measurement and processing routines that are required for any project. Our in-house team of electrical and software engineers work regularly with our monitoring division to ensure that we are delivering high quality measurements that meet the project-specific needs.

+ FAT

During the manufacturing of monitoring systems, BDI takes care to Factory Acceptance Test (FAT) all systems before shipping. This largely reduces the need for on-site troubleshooting and helps our field teams be more efficient. Sensors, data acquisition, internal communications, external communications, internal power distribution, and external power transformation are all set up in our testing facility in CO where the ongoing monitoring team verifies system functionality and specification compliance. FAT reports are available upon request.

+ SAT

While our field crews are installing instrumentation, our ongoing monitoring team is verifying the as-installed performance of the monitoring system. Starting with communications and power distribution, the health of the monitoring system and specification compliance (battery backup, circuit protection, etc.) are tested and documented. Before the field crew demobilizes, every sensor is also verified to ensure that mapping is correct, sign convention is noted, and response is satisfactory. SAT reports are available upon request.

ELECTRONIC DATA SECURITY

All our servers are protected by robust firewalls and monitored for performance and security on a 24/7 basis. We also have fully encrypted and complete backup systems for all servers. We perform quarterly vulnerability audits to determine if there are any potential security holes, or newly-discovered exploits.

6 | OUR PARTNERS

Since there are so many varied applications for diagnostic testing, monitoring, and NDE, we have developed excellent working relationships with the following firms to bring additional expertise to our projects when required:

ADVANCED MONITORING METHODS

As BDI's environmental monitoring partner, Advanced Monitoring Methods (AdvM2) provides a wide range of services, including meteorological monitoring, air quality (particulate, criteria pollutants, and VOCs), noise, flood alerts, hazardous compounds, and energy. AdvM2 also provides a complete suite of air modeling and permitting services to complement the monitoring services.

CAMPBELL SCIENTIFIC

BDI has been a Value-Added Reseller for Campbell Scientific since 1990, giving us valuable experience in designing, implementing, and maintaining monitoring systems using Campbell Scientific data acquisition systems. Additionally, Campbell Scientific lists some of our sensors within their portfolio of sensors to be used with their systems.

DYWIDAG

As one of Europe's largest monitoring specialists, DYWIDAG supports BDI's international presence by providing both technical and human resources to achieve tight deliveries. DYWIDAG also ensures that technically challenging projects receive the necessary and required attention to achieve project success every time. Additionally, DYWIDAG has developed several highly-successful railway-specific monitoring instruments within its 'MATE' range. BDI is an authorized reseller and installer of these products for the Americas.

GEOKON

BDI is an authorized Geokon reseller and we have been doing business together for more than 25 years. We keep a large inventory of both Geokon instruments and data acquisition components in-house for immediate deployment.

INSTANTEL

BDI is an authorized Instantel reseller and integrator and can provide vibration and noise systems like the MicroMate. We sell and lease vibration and noise monitoring equipment for local monitoring or integrate the system into a fully automated online monitoring system.

LEICA

BDI is an authorized reseller and integrator for Leica products. We can provide both automated and manual geospatial monitoring installations. We both lease and resell Automated Total Station (ATS) and GNSS (GPS) based systems for client internal use or fully integrated into BDI's online monitoring portal—Platform Interactive.

MICRO-MEASUREMENTS

STS4 systems have been designed to work seamlessly with Micro-Measurements strain gages. BDI is also an authorized installer and distributor of Micro-Measurements gages (primarily through our GSA account).

MISTRAS

MISTRAS is a leading, OneSource, global provider of technology-enabled asset protection solutions used to maximize the uptime and safety of critical energy, industrial, and public infrastructure. MISTRAS combines our industry-leading services, products, technologies, and software to provide a unique, custom-tailored solution for each customer's individual asset protection need.

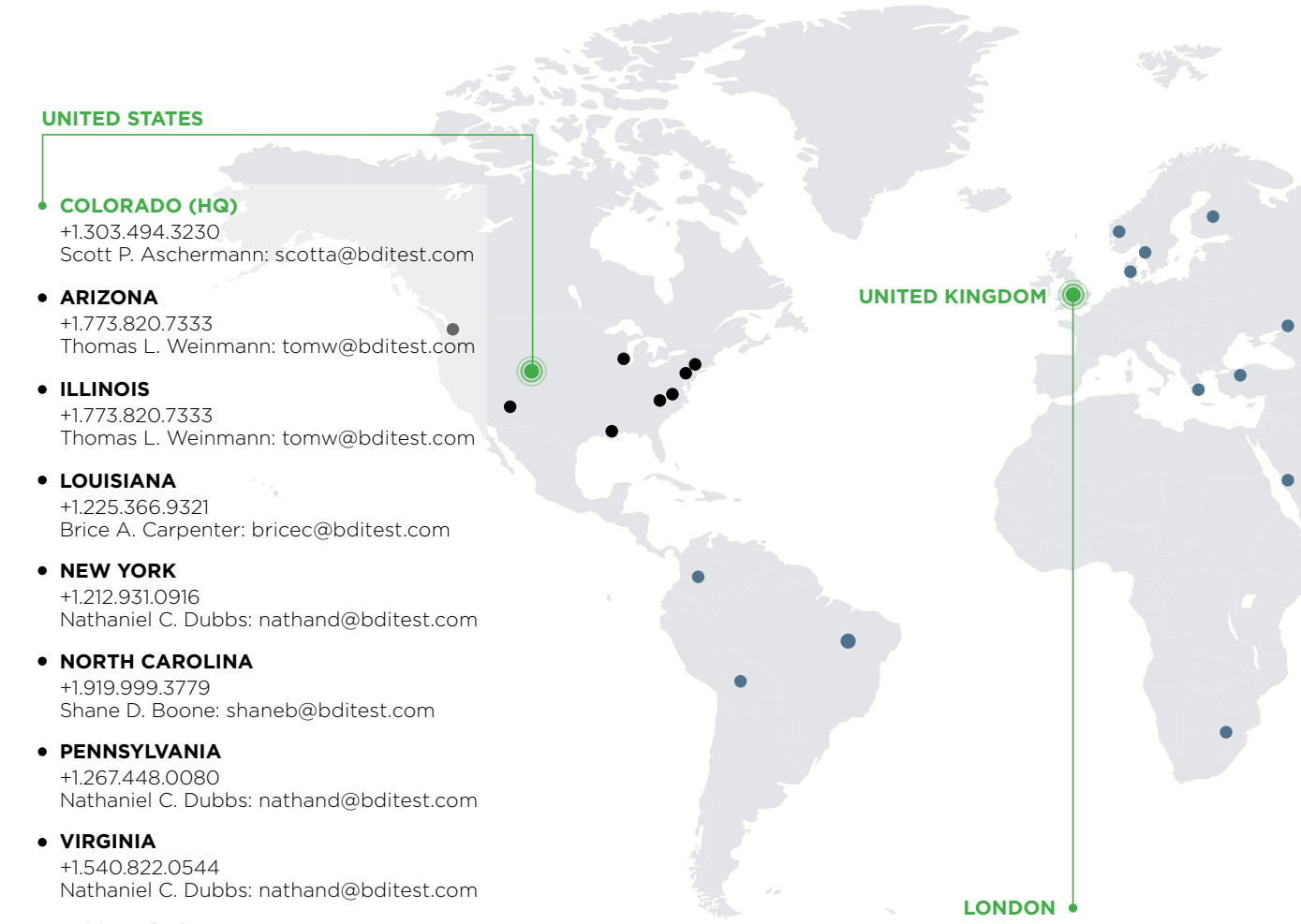
RST

RST Instruments' fully integrated suite of geotechnical monitoring sensors gives our clients the reliable, real-time data they need to save time, money and, most importantly, reduce risk at every stage of their projects. For over 40 years, RST has provided engineered instrumentation, custom solutions and matchless industry expertise to keep clients' projects–and reputations–safe.

US AERIAL VIDEO

UAV Exploration Inc. is an aerial remote sensing provider specializing in Unmanned Aerial Systems. We provide industry leading UAS geophysical services focusing on drone-based aeromagnetic surveying.

7 | GLOBAL SUPPORT



UNITED STATES

COLORADO (HQ)
+1.303.494.3230
Scott P. Aschermann: scotta@bditest.com

- **ARIZONA**
  +1.773.820.7333
  Thomas L. Weinmann: tomw@bditest.com
- **ILLINOIS**
  +1.773.820.7333
  Thomas L. Weinmann: tomw@bditest.com
- **LOUISIANA**
  +1.225.366.9321
  Brice A. Carpenter: bricec@bditest.com
- **NEW YORK**
  +1.212.931.0916
  Nathaniel C. Dubbs: nathand@bditest.com
- **NORTH CAROLINA**
  +1.919.999.3779
  Shane D. Boone: shaneb@bditest.com
- **PENNSYLVANIA**
  +1.267.448.0080
  Nathaniel C. Dubbs: nathand@bditest.com
- **VIRGINIA**
  +1.540.822.0544
  Nathaniel C. Dubbs: nathand@bditest.com
- **WASHINGTON**
  +1.206.501.3216
  Brett Commander: commander@bditest.com

UNITED KINGDOM

LONDON
+44 203 769 3281
Scott P. Aschermann:
scotta@bditest.com

AUSTRALIA, NEW ZEALAND, SOUTH AFRICA, & INDONESIA

HMA Group
+61.3.8720.6770
Craig Bruce: cbruce@hmagroup.com.au
hmagrp.com

BOLIVIA

TEC: Tecnología para la eficiencia
+591.4.440.0917
Gabriel Muñoz: gabrielrmc01@gmail.com

BRAZIL

G5 Engenharia
+55.41.3402.1707
Wilson Soares, Jr.: wsj@g5engenharia.com.br
g5engenharia.com.br

CHINA

Earth Products China (EPC)
+852.2392.8698
Frank Ko: frank@epc.com.hk
epc.com.hk

COLOMBIA

Arec, LTDA
+57.1.215.1217
Andres Restrepo: andres.restrepo@arec.com.co
arec.com.co

GREECE

Setpoint Technologies, Ltd.
+30.210.6100350
Manos Larintzakis: manos.larintzakis@setpoint.gr
setpoint.gr

NEOTEK
+30.210.9341533
Paris Xystris: paris.xystris@neotek.gr
neotek.gr

INDIA

Complete Instrumentation Solutions Pvt. Ltd.
+91.124.4929000
Neeraj Chadha: neeraj@instrumentation-solutions.com
instrumentation-solutions.com

METCO
(Metal Engineering & Treatment Co. Pvt. Ltd.)
(for structural health monitoring projects)
+91.89024.95383
Sankalpa Gan: sankalpa.gan@metco.in
metcocal.com

INDONESIA

PT. Struktur Pintar
+62.21.5278835
Poltak Nababan: poltak@strukturpintar.com
strukturpintar.com

PT. Testindo
+62.21.29563045
Zulfriki: za@testindo.com
testindo.com

MIDDLE EAST

Co-mender, Inc.
+1.819.4841022
Wassim Mahfouz: info@co-mender.com
co-mender.com

Inspectech - a Division of Kabbani Construction Group
+1.966.2.627.8149
Mustafa Raad: inspectech@ikkgroup.com
kcg-ikk.com/main_en/companies/inspectech

SWEDEN, DENMARK, NORWAY, FINLAND

Load Indicator System AB
+46.707.27.42.30
Jacob Heide - Jörgensen: jhj@lisab.se
lisab.se

TAIWAN

Davisson-Geokon Industrial Co., Ltd.
+886.02.27399127
info@davisson.biz
davisson.biz

TURKEY

METATEST Test ve Ölçüm Cih. Ltd. Şti
+90.312.394.7121
Erman Tuncay: erman@metatest.com.tr
metatest.com.tr

VIETNAM

Scientific Technical Supplies (STS) Co., Ltd.
+844.39424601
Tung Pham Hoang: tung-ph@stsvietnam.com.vn
stsvietnam.com.vn

RAW DATA. REFINED RESULTS.

COLORADO (HQ)
+1.303.494.3230

LOUISIANA
+1.225.366.9321

PENNSYLVANIA
+1.267.448.0080

ARIZONA
+1.773.820.7333

NEW YORK
+1.212.931.0916

VIRGINIA
+1.540.822.0544

ILLINOIS
+1.773.820.7333

NORTH CAROLINA
+1.919.999.3779

WASHINGTON
+1.206.501.3216

LEARN MORE AT BDITEST.COM