NUCLEAR T&D

ALTERNATIVE

One Source Solutions for
POWER Inspection & Engineering

Services | Systems | Products | Monitoring
MISTRAS Group specializes in Power Generation inspection and engineering services and develops products and systems that support these services. **This innovative one source capability uniquely qualifies MISTRAS as a global industry leader today.**

MISTRAS’ suite of asset protection solutions applies to a wide array of Power Generation sectors including:

- Nuclear
- Fossil
- Alternative and Renewable Energy
- Transmission and Distribution

MISTRAS has a successful history of providing asset protection products and services for both operating plants, wind turbine farms, and new construction projects.

**MISTRAS INNOVATIONS FOR POWER GENERATION**

**MISTRAS’ Fleet Capabilities Include:**

- Nuclear Inspection Services
- Traditional Inspection Services
- Traditional Nondestructive Testing (NDT)
- Advanced Nondestructive Testing
- Materials Testing
- Third Party Quality Assurance
- Predictive Maintenance Services
- Product and System Solutions
- Wind Turbine Composite Repairs
- Acoustic Emission (AE) Solutions
- Continuous Monitoring Solutions
- Asset Integrity Management Services (AIMS)
- Plant Condition Management Software (PCMS™)
- Mechanical and Piping Integrity Engineering
- General Engineering Services
- Piping and Mechanical Aging Management Programs
- Centers of Excellence (providing best practices, research, support and training)
GLOBAL REACH, LOCAL APPROACH

Successful service support depends on global capabilities that can be delivered on a regional basis with local presence.

MISTRAS (NYSE:MG) operates in countries throughout Europe, Asia, and the Americas, delivering its clients global project support while providing a local, consistent level of service. The company focus on customer needs, innovation, reliable services, and best practices, has positioned MISTRAS as a leading international provider of engineering and inspection services.

MISTRAS continues to expand with new facilities and capabilities around the world. This has resulted in an ongoing growth and expansion of Power Generation specific service and product capabilities.

The MISTRAS Power Generation Group has the resources of the regional offices, service locations, and Centers of Excellence to promptly respond to service requests.

The Centers of Excellence (COE) include:
- Nuclear Power
- Fossil Power
- Asset Integrity Management
- Mechanical Integrity
- Pipeline Integrity
- Engineering Services
- PCMS® Software & Services
- Above Ground Storage Tanks
- Automated Ultrasonics
- Refractory Inspection
- Substation Reliability
- Tube Inspection
- Predictive Maintenance
- Ropeworks® Rope Access
- Transportation
- Continuous on-line Monitoring

BENEFITS OF MISTRAS ONE SOURCE CAPABILITIES

- Reduces contracting costs
- Reduces production costs
- Turnkey product and service provider
- Technical expertise and experience
- Customer culture and process adaptation

sales@mistrasgroup.com
Since the late 1960s, MISTRAS has provided services to support nuclear construction, maintenance, refueling outages, and major component replacement projects. These services have been provided on various nuclear power reactors including: Pressurized Water Reactor (PWR), Boiling Water Reactor (BWR), and Canada Deuterium Uranium (CANDU).

The MISTRAS ISO 9001 accredited Quality Assurance Program meets the Nuclear Quality Requirements of 10 CFR 50 Appendix B, 10 CFR Part 21, and ANSI/ASME NQA-1.

Quality Services
- ASME NQA-1 Lead Auditor Personnel
- Vendor Audit and Surveillance Personnel
- Quality Control Inspection Personnel Certified in Accordance with ANSI N45.2.6
- Certified Welding Inspectors (CWI)
- Quality Consultant Services
- Quality Training Services

In Service Inspection (ISI) services
- Level III Services (per Section XI, Appendix VII requirements)
- VT- 1, 2, 3 examinations in accordance with ASME Section XI, including IWE/IWL and Code Cases N-722 and N-729
- Performance Demonstration Initiative (PDI) UT qualified examinations
- Manual and Encoded Phased Array UT examination for limited access, Dis-similar Metal and Overlay welds
- Engineering support, third party oversight, outage supervision
- Relief request assistance, procedure/program development and review, indication evaluation
- IVVI inspection, refuel floor coordination and reactor vessel head lift rig assembly inspection
- Buried Pipe Inspection utilizing Guided Wave (GUL) and Buried Piping Initiative Program (BPIP) services including assessment, inspection, mitigation and rehabilitation services

NUCLEAR
Balance of Plant (BOP) and Flow Accelerated Corrosion (FAC) Services

- Level III services including program review and assessment
- Experienced level I and level II technicians
- Software solutions and data management of ultrasonic examination results for tracking and trending
- ASME Code compliant Ultrasonic Flaw Examinations of components and welded joints, Magnetic Particle, Penetrant and Visual examination of components and welded joints
- Planning, scheduling, and supervision of BOP NDE programs
- Complete program development and review (see engineering)
- CHECWORKS and Fossil FAC Advisor model development and reviews (see engineering)
- System susceptibility screening (see engineering)
- Outage plan development and support (see engineering)
- Life Cycle Management (see engineering)

Steam Generator Inspection Solutions

- Primary and Secondary - Once Through Steam Generator (OTSG) and Recirculating Steam Generator (RSG) plants
- Ultrasonic Rotating, Ultrasonic Phased Array Systems, & Eddy Current Systems with 3D modeling
- Level II and III – ANSI/ASNT CP-189 and Qualified Data Analysts (QDA) certification in accordance with EPRI PWR SG Examination Guidelines, Appendix G
- Certified Level I & Level II Acquisition Personnel
- Qualified Eddy Current Platform Technicians
- HP and PC network support personnel to assist in configuring both on-site and remote data analysis facilities
- Remote Visual Inspection – scheduled inspection and repair campaigns

Heat Exchanger Condition Assessment and Inspection

- Internal Rotary Inspection System (IRIS) Technicians and Analysts - Quantifiable data on the ID or OD damage to tubes
- Near Field Testing (NFT) Technicians - Fin fan (air coolers) inspection designed tube bundles. Also available in standard ET equipment platform, NFT is a very reliable technique to determine ID anomalies, such as inlet erosion, corrosion, and pitting
- Remote Field Testing (RFT) Technicians - Carbon steel tube bundles inspection. The RFT technique does not require tubes to be as clean as other techniques.

Program Development and Consulting Services

With representation on ASME and International code committees and participation at industry conferences on leading plant issues, MISTRAS consultants are cognizant of relief requests that can reduce the scope of internal stress testing in areas such as containment spray pump testing, safety injection check valve testing, and skid mounted positions, to name a few. This diverse knowledge and experience enables MISTRAS to help clients establish an IST program that addresses the concerns of regulatory agencies as well as internal plant customers (e.g., systems engineering, operations, maintenance, etc.).

Benefits of Utilizing MISTRAS Nuclear Services

Experience – Serving the nuclear industry since the late 1960s
Expertise – No one provider has the depth of both engineering and inspection solutions to enhance life extension and ensure code compliance
Cross Training – Most of our certified technicians have multiple certifications allowing MISTRAS customers the ability to minimize the number of subcontractors, production downtime, and increase project efficiency.
MISTRAS provides inspection and engineering services for existing and newly constructed coal-fired, natural gas, and other fossil plants.

Outage Services
- Outage Inspection Planning and Management
- Condition Assessment and Gap Analysis
- Third Party QA Services, Vendor Surveillance and Oversight
- Nondestructive Examination
- Certified Welding Inspector (CWI), and Visual Inspection
- Pipe Stress Analysis
- Materials and Process Selection
- Many other pertinent services

Boiler and HRSG Tube Leak Inspection
- Engineering and Inspection Solutions – OD Erosion, Corrosion and Overheating, Hydrogen Damage, Caustic Corrosion, Chemical Attack, Cracking: Corrosion/Thermal Fatigue & Stress Corrosion, and Creep-ID Oxide Scale
- Phased Array Ultrasonic (PAUT) and Time of Flight Diffraction (TOFD) testing – High speed and reliable results
- Computed Radiography (CR) – code compliant, substantially less processing time and efficient digital record archiving
- Tube Inspection, Leak Monitoring, and continuous Online Acoustic Monitoring (see Products section)
- Materials Testing

Flow Accelerated Corrosion (FAC)/Corrosion Under Insulation (CUI)/Buried Pipe
- Visual and Ultrasonic Thickness Testing (UTT) – Reliable inspections including wall thickness mapping and test results
- Profile Radiography – Film, Computed and Digital applications providing digital images to record as tested condition
Fluoroscopy – Non-intrusive screening tool, real time radiography results
Pulsed Eddy Current (PEC) – Non-intrusive method to determine corrosion activity and wall thickness (insulation can stay in place during testing)
Guided Wave Long Range Ultrasonic Testing (GUL) - Large sections of piping can be inspected rapidly and safely
Extensive Mechanical Integrity and Piping Integrity additional engineering programs (see Engineering section)

Balance of Plant (BOP)
Heat Exchanger/Condenser – Internal Rotating Inspection Services (IRIS), Remote Field Eddy Current, Near Field Eddy Current, and standard Eddy Current
Tank Inspection – Comprehensive tank testing programs adhering to API-653 in service and out of service inspections guidelines include the use of: UTT readings, Ultrasonic Corrosion Surveys of tank shells and roofs, Magnetic Flux Exclusion (MFE) testing of tank floors, Ultrasonic Prove up of indications found during MFE testing for volumetric determination, Tank Strapping, API 653 calculations including safe fill height and edge settlement, and non-intrusive Acoustic Emission Tank Inspections
Construction Inspection Services – AWS/CWI Inspection, QA/QC Third Party Verification, and Nondestructive Examination
Stack Inspection – rope access inspections and ongoing monitoring services
Traditional nondestructive examination services include – Visual, Ultrasonic Testing (UT), Radiography (RT), Magnetic Particle Testing (MT), and Liquid Penetrant Testing (PT)

Turbine Inspection
Inspection of rotors, diaphragms, studs, bearings, valves, turbine re-build inspections
Third party oversight, QA services, vendor surveillance
Ultrasonic Shear Wave Testing (UT), Phased Array Ultrasonic Testing (PAUT), Magnetic Particle Testing (MT), Liquid Penetrant Testing (PT), and Visual & Remote Visual Examination

High Energy Piping
Material Verification & Seam Weld Verification
Hanger Verification and Inspection in cold and hot conditions, and recommendations for hanger adjustments/replacements
NDE weld examination including Fluoroscopy and PAUT
HEP Assessment to include: Main Steam System, Hot Reheat System, Cold Reheat System, Auxiliary Steam System, Boiler Blowdown System, Boiler Feed System, Heater Drain System, Heater Vent System (see Engineering section)

Computed RT and Phased Array UT Produces Millions in Savings
In a recently completed outage for a large national utility, MISTRAS evaluated more than 15,000 welds of various diameters and thicknesses for weld quality and final code acceptance using a combination of Computed Radiography and Phased Array Ultrasonics in lieu of traditional Radiography.
This comprehensive radiographic and ultrasonic inspection plan allowed the utility to shorten the schedule by 14 full production days, resulting in an estimated $14M in production cost and downtime savings.
ALTERNATIVE AND RENEWABLE ENERGY

WIND
MISTRAS provides reliable on-shore and off-shore inspection and maintenance that prolong the useful life of their customer’s assets. The centerpiece of these inspection and maintenance services is the MISTRAS Ropeworks center of excellence that provides rope access services.

Rope access can often be deployed in lieu of lifts or cranes. The work is completed safely, efficiently, and economically with a focus on minimizing asset downtime.

Blade Services
• Internal and external inspection
• Laminate and coating repair
• Construction assembly support
• Inspection and installation of lightning protection systems
• Repair and installation of blade protection and aerodynamic systems
• Spotting Scope Inspections
• Ultrasonic scanning of rotor blades

Tower and Nacelle Services
• Internal and external inspection: Visual & NDT
• Tower flange sealing
• Coating repair
• Inspection of landing bolts
• Bus bar service and retrofit
• Drivetrain Inspection and Monitoring
• Transformer Inspection and Monitoring

Other inspection services include:
• 3rd party QA vendor qualification/surveillance
• Vendor/Fabrication Shop NDT
• AWS Certified Welding Inspection

BIOMASS CONSTRUCTION AND MAINTENANCE
• Traditional nondestructive examination testing services include: Ultrasonic Testing (UT), Radiography (RT), Magnetic Particle Testing (MT), and Liquid Penetrant Testing (PT)
• AWS/CWI Inspection
• Third Party Verifications
• Positive Material Identification and Hardness Testing
• Material Receipt Inspection
• QA Document Review
• Product and Systems solutions
• Engineering Services

HYDROELECTRIC
MISTRAS provides all aspects of hydroelectric facility inspection services for maintenance and construction, including: installation, repairs, refurbishment, fabrication, equipment inspections, and overhauls. Services Include:

• Turbine Inspection Services
• Piping & Underground piping inspection
• Coupling, Bearing, and Gearbox Inspection
• Stop valve
• Lube oil systems
• Nondestructive Testing
• Provide Generator/Switchgear testing
• Product and Systems solutions
• Engineering Services
• Gate & spillway inspection
• Acoustic monitoring of blades and towers
• Composite engineering services
• End-of-warranty inspection services
• Failure analysis
• Factory quality assurance
MISTRAS offers Diagnostic and Continuous On-line Monitoring of power transformers utilizing a combination of NDT. An early detection of various unacceptable conditions will provide vital in-service information for determining safe and reliable operations. More than 1,000 transformers have been tested.

**Diagnostic testing benefits for high-voltage power equipment:**
- Non-intrusive monitoring and analysis
- Prevention of potential losses
- Encourage life extension
- Promotes planned vs. unplanned replacement and repair
- OEM pre warranty expiration inspection
- Factory QC acceptance and commissioning

**Techniques for substation inspection include:**
- Acoustic Emission
- Vibration Analysis
- Dissolved Gas Analysis (DGA)
- Oil Sampling
- Thermography
- Visual Inspection
- Electrical Technique (HFCT)

Diagnostic testing and monitoring include the following components:
- Breakers
- Bus bars
- HV Cable Splices
- Load tap changers
- Gas Insulated Substation (GIS)
- Instrument Transformers

MISTRAS on-line Monitoring services can be used to bridge transformer operation until replacement, as well as collect vital baseline data and valuable fault prediction information. Special operating conditions include: emergency overloads, solar storms, and commissioning.

**SF6 Leak Monitoring**
SF6 monitoring combines the latest advances in sensor, processor, wireless mesh networking, and energy harvesting technology and packaging to accurately track and determine leak rate in breakers and gas insulated substations.

**REALIZED SAVINGS**

**Monitoring Solutions for Power Transformers**
While replacing transformers is not technically difficult, it is a logistical and time-consuming challenge that can take up to two years. Since most transformer failures are preventable, the MISTRAS monitoring solutions can result in multimillion dollar savings:
- Prevent unscheduled shutdowns
- Eliminate on-site spare unit need
- Avoid costly capital expenditures
- Prevents EPA fugitive emissions
- Maintains dispatch flexibility
- Encourages consistent operating capacity
Through advanced research, development, engineering and production, MISTRAS on-line products improve reliability, increase efficiency, provide early warning of problems, and optimize remaining life of your assets.

**Industry Demands**

MISTRAS products and systems meet the challenges facing the power industry today. These products and systems are often developed in collaboration with industry research institutes and utility owners.

**Gas Turbine Blade and Vane Monitoring**

The ACTMSTM line of combustion turbine monitoring systems use continuous on-line non-intrusive sensors to detect unusual events during operation. Vane cracking, clashing, rubbing, and foreign object damage, domestic object damage (FOD-DOD) ingestion are reported in real time to the plant operations or fleet Monitoring and Diagnostics (M&D) center for disposition. This often prevents additional and costly damage to the compressor or turbine.

**Gas Turbine Flange Leak Monitoring**

Real time detection of leaks in liquid and gas fuel line flanges provide early warning of a potentially hazardous environment. Low cost, airborne acoustic sensors can detect and triangulate leak locations making identification and repair possible with minimal cost.

**Boiler and HRSG Tube Leak Detection**

The MISTRAS Triple 5 Acoustic Monitoring System (AMS) provides continuous feedback on boiler, feedwater heater, and condenser tube leaks. Installed in more than 300 plants, the MISTRAS metal-borne acoustic monitoring technology is the industry preference for providing an early indication of an acoustic event.

**Dry Flow Detection Systems**

Detects reductions in flow or blockages in air driven, dry product delivery systems. Used in applications where the uninterrupted flow is crucial to the reliability and availability of the operation, it provides early warning to prompt corrective action. Applications range in complexity from simple go/no-go dry sorbent injection systems for SOx control to more critical balancing of limestone injection between front and back wall in circulating fluidized bed (CFB) boilers.
Nuclear Instrumentation Loose Parts Monitoring System (LPMS™)

The LPMS™ was developed for a Nuclear Steam Supply System (NSSS) to detect metal-to-metal impact in the reactor cooling system of nuclear plants using advanced, real-time alarm discrimination. Undetected, loose parts can cause flow blockages, RCS boundary integrity issues, and weakening of safety related components.

Valve Flow Monitoring System (VFMS)

VFMS detects flow conditions on critical valves in nuclear plants. Main steam isolation valves and power operated relief valves are monitored for leaks and open conditions. Using radiation resistant sensors, the non-intrusive installation provides critical guidance during trip events.

Acoustic Emission Leak Detection (AELD)

AE Leak Detection (AELD) is an Acoustic Emission (AE) technique that utilizes piezoelectric transducers to detect the sounds produced by an active leak. This method has been used successfully for many years in operating nuclear plants to detect and isolate leaks in the reactor cavities, transfer canals, as well as spent fuel rod storage pools.Leaks make sounds primarily as a result of turbulent flow through the leak orifice. These sounds are coupled into water very efficiently, where it can be detected by piezoelectric devices such as AE sensors. For continuous leak detection monitoring, large, multiple channel Acoustic Emission systems such as the Acoustic Leak Monitor (ALM), Acoustic Leak Monitor System (ALMS), Sensor based Acoustic Multi-Channel Operation Systems (SAMOS), can manage hundreds of sensors for large area plant coverage for leak detection and location.

Portable Solutions

SteamPAC™ and VPACII™ are portable valve leak detection and quantification instruments. The systems are engineered to “listen” to the energy released during the transition from laminar to turbulent flow in the steam path while eliminating background noise generated by nearby mechanical components like pumps, motors, and actuators. The technology determines the amount of steam passed through the leaking valve seat. This value is critical in prioritizing maintenance and repair to improve heat rate.
Predictive & Reliability Center Maintenance

MISTRAS provides Predictive (PdM) & Reliability Center Maintenance (RCM) Engineering and Technical services. This includes performing a Gap Analysis to ensure the PdM program is compliant with current manufacturer, code, and best practices. MISTRAS also delivers complete RCM program development which includes: Asset Criticality, Failure Modes & Effects Analysis (FMEA), Reporting, Cost Benefit Analysis, and Root Cause Analysis all within the workings of the customer Computerized Maintenance Management System (CMMS). The program will include follow-up PdM Services to complete the reliability process.

Our unique services include:

- Program Assessments / Gap Analysis
  - Benchmarks customers programs to industry and world class maintenance standards and provides an organized plan for implementation of PdM Technologies.
- Complete RCM Development
  - Asset Criticality, FMEA, Reporting, Cost Benefit Analysis, Root Cause Analysis
- On-line Vibration Monitoring
- Walk-Around Vibration Services
  - MISTRAS has written over 20% of the United States Nuclear Power Industry Databases
- Advance Vibration Diagnostics
  - Operational Defection Shapes (ODS), Modal Analysis, Cross Phase Analysis, Engineering Design, etc.
- Infrared Thermography Inspections
  - Short and Long Wave Cameras and Analysis
- Lube Oil and Grease Analysis
  - Off-site and On-site Mobile Lab
- Ultrasonic Lubrication and Leak Detection
  - Lubricate what needs to be lubricated. We find, document, and quantify leaks in energy loss dollars
- Motor Condition Monitoring
  - Off-line and On-line Motor Testing
- Field Balancing Services
- Root Cause Engineering Analysis
- Laser Shaft Alignment
- Strain Gage Materials Testing and Stress Analysis
- Third Party Acceptance Testing
  - We make sure your new or rebuilt equipment is running correctly before you take ownership of it
- Installation & Maintaining of Permanent On-line Vibration Monitoring Systems
- Complete PdM training and Certification
MATERIALS TESTING

Mechanical Testing
- Tensile Testing with Stress/Strain Diagram
- Guided Bend Testing
- Charpy Impact Testing
- Hardness Testing
  - Rockwell-HRA, HRB, HRC
  - Brinell-King
  - Telebrineller
  - EquoTip, Pin
  - Vickers and Knoop Microhardness—50 gram to 50kg loads
- Delta Ferrite by Fischer Feritscope
- In-House Machine Shop
- Chemical Analysis/PMI (Positive Material Identification)
  - Portable XRF Spectroscopy
  - Optical Emission Spectroscopy (OES)
    Both portable field unit and Lab stationary

Welder Qualification and Testing
- Develop, Write, and Qualify Welding Procedures
- Perform In-House Welder Testing and Certification
- SMAW, GTAW, GMAW, and FCAW Processes
- Stress Relieving to 1600°F

Metallography
- ASTM E-112 Grain Size Determinations
- Ferrite Volume Fraction Determinations by Point Count per ASTM E-562
- Mounted (50mm dia. mounts) micro sections
- Macro section preparation up to 10" x 10"
- Reflected light microscopy, DIC, polarization
- Image analysis - Inclusion evaluation
- Field Microstructure Replication (FMR) and In-Situ Metallography

Corrosion Testing
- Intergranular Corrosion Testing per ASTM A262-13
- Pitting and Crevice Corrosion Testing per ASTM G48-11
- Other ASTM and NACE

Metallurgical Engineering
- Microstructural Evaluation
- Boiler Tube/Heat Exchanger Tube Evaluation
- Failure Analysis including:
  - Deposit Weight Density Determinations (DWD) per ASTM D-3483 Method C
  - Deposit Analysis via Scanning Electron Microscopy coupled with Energy Dispersive X-ray Spectroscopy (SEM/EDX), XRF, XRD as required
- Failure Analysis
MISTRAS delivers exceptional value to its clients in Asset Integrity Management, Mechanical and Piping Integrity, and Capital Project Engineering Services.

**Asset Integrity Management Services (AIMS)**

MISTRAS has a Center of Excellence that specializes in providing Asset Integrity Management Services (AIMS). AIMS refers to the management system and processes that enable plant owners to maintain the integrity of their assets in a Fit for Service condition for the desired lifespan.

**AIMS Engineering Services**

- Fitness for Service (FFS) Evaluation
- Plant Equipment Design & Maintenance
- Plant Equipment & Piping Integrity Assessment
- Damage Mechanism Review
- Materials/Corrosion & Root Cause Failure Analysis
- Facility Circuitization/Systemization

**Development**

- PSM & Mechanical Integrity Audits
- OSHA Compliance Assessments
- PSM and Mechanical Integrity Programs

**Optimization**

- Risk Based Inspections (RBI)
- RBI Assessments
- RBI Implementation
- RBI Data Validation
- RBI Database Configuration

**Flow Accelerated Corrosion**

Corrosion is a fundamental problem for power generators. To combat this problem, MISTRAS has developed an effective Flow Accelerated Corrosion (FAC) program to identify early signs of pipe wall thinning and ruptures. If ignored, leaks and potentially catastrophic ruptures can endanger personnel safety and plant reliability as well as degrading other equipment such as valves, heater shells, and tanks – and vessels. Ruptures can also lead to personnel injury, significant plant downtime, and lost revenues.

Through strategic partnerships MISTRAS has also been associated with the development and incorporation of plant operator input into plant FAC programs. This included a recently completed report for EPRI entitled “Guidelines for Interviewing Plant Personnel within a Flow Accelerated Corrosion Program,” which provides the methodology used to obtain and incorporate operations input, an extremely important part of an effective FAC program. Its partners have been active in evaluating more than half of the existing nuclear plants and over 100 fossil plants in the U.S. for FAC, with the goal of minimizing costs to the utility and ensuring vigilant detection of worn components.

- Complete program development and review
- CHECWOKS and Fossil FAC Advisor model development and reviews
- System susceptibility screening
- Outage plan development and support
- Life Cycle Management

**Buried Piping**

Buried piping and the effects of general and/or specialized corrosion create a hidden liability for commercial, industrial, and all types of power generation facilities.

Using the latest industry standards, MISTRAS provide the programmatic and technical expertise necessary to determine the condition of customers’ buried piping and provide cost effective solutions as needs arise. MISTRAS specializes in developing piping inspection, monitoring and maintenance programs to provide our customer with the tools they need to maximize piping system life.

For nuclear customers, this includes integrating buried piping capabilities with the Life Cycle Management program abilities, thus providing the necessary support to assist customers seeking operating license extension.
Capital Project Services

MISTRAS provides a complete range of Capital Project Services to assist customers in managing engineering and construction projects. MISTRAS is staffed to provide engineering services from planning and designing through overall project execution and support of the plant start-up.

MISTRAS Engineering specializes in these project management services:

- Planning for overall project execution
- Validating cost estimates and control tools
- Ensuring constructability of the facility
- Providing contracting services
- Supporting project procurement
- Controlling the quality of design/engineering
- Making Independent Project Reviews
- Strengthening construction planning and safety
- Assisting in plant completion and start-up
- Staffing the Owner’s Project Team

The MISTRAS Turnkey Solution and PCMS®

MISTRAS has developed a proven systematized method that creates a closed-loop cycle for addressing continuous asset protection and improvement. PCMS® is a comprehensive software application developed specifically to assist facilities implement effective mechanical integrity and process safety programs.

PCMS® Benefits:

- Store asset data and control documents in one place, reducing redundancy and streamlining
- Record keeping
- Maintain design and operating characteristics for fixed, electrical and rotating equipment
- Capture activities such as inspection reports, test results and maintenance requests
- Interface with data loggers, PMI (Positive Material Identification) equipment, etc.
- Calculate corrosion rates, remaining life, due dates and risk rankings
- Plan future activity such as compliance inspections, maintenance activities, and equipment tests
- Recommend effective inspection techniques and monitoring solutions
- Link to maintenance management systems such as SAP, Maximo, and EMPRV
- Link to continuous monitoring applications to proactively identify potential problems
- Provide KPI (Key Performance Indicators) to benchmark asset and facility performance

The MISTRAS Innovative Turnkey Solution Cycle

- Development of a “customized” Mechanical Integrity program
- Perform the actual inspection and monitoring of the identified assets
- After the data is gathered, evaluate the results
- Provide recommendations based on the inspection plan and data