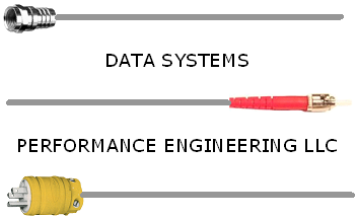

DATA SYSTEMS PERFORMANCE ENGINEERING, LLC

Mission statement: To improve the performance and reliability of data acquisition, data computation, and control systems by optimizing their interface to their environment.

Company philosophy: "One Measurement is Worth a Thousand Expert Opinions" (author unknown)

Complex computer systems consisting of many internetworked nodes can suffer from unexplained anomalies, performance shortcomings, premature failure of components, unexplained loss or corruption of data, and many other issues. Ofttimes these anomalies are not caused by either the system hardware or software but by the environment into which the system is installed and the networks that interconnect the disparate nodes.

Data Systems Performance Engineering LLC takes a unique approach to analyzing the causes for system performance issues. Rather than concentrate on single specialized issues, for example, power quality *or* grounding, bonding, and shielding *or* network cabling, Data Systems Performance Engineering LLC takes an integrated multi-disciplinary approach and considers *all* factors that could effect system operations and component longevity.

Data Systems Performance Engineering LLC follows the following steps to achieve the goals of optimizing system performance and reliability:

- Communicate with the customer to determine the issues
- Review the installed system
- Measure, Measure, Measure
- As issues are uncovered, develop theories and experiment with possible corrective actions for these issues
- Analyze the data accumulated
- Prepare detailed documentation with problems found and recommendations for improvement

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After customer implementation of the recommendations for improvement, Data Systems Performance Engineering LLC is available to return to the system to assure that the recommended changes have been properly implemented. If new problems arise after implementation of recommendations (these anomalies would have been hidden behind other problems), Data Systems Performance Engineering LLC is available to return to address these newly uncovered issues. The quality that differentiates Data Systems Performance Engineering LLC from others in the field is the ability to explore, without prejudice, any aspect of complex system installations using a truly multi-specialty expertise to analyze and solve problems.

Data Systems Performance Engineering LLC can also design or provide a third-party review of designs for power, grounding, bonding, shielding, network, and intrinsically safe systems, supervise the implementation of these designs, and verify that the design meets the specified requirements.

Data Systems Performance Engineering LLC is not affiliated with any system manufacturer. The company can provide an independent, objective and unbiased review of environmental and electrical accomodations for high availability data processing, process control, and communications systems.

A detailed description of available services follows.

If Data Systems Performance Engineering LLC can be of further service, please do not hesitate to contact us as follows:

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DATA SYSTEMS PERFORMANCE ENGINEERING LLC

DETAILED DESCRIPTION OF AVAILABLE SERVICES

1. Power quality services

- Evaluate electrical requirements for systems: current requirements, voltage requirements, line regulation, harmonic distortion, power factor, non-linearity of loads
- Troubleshoot existing power systems anomalies relating to input/output device instability, network problems, computer crashes, data corruption, AC line instability, equipment failures, harmonic distortion, etc.
- Evaluate existing electrical system for suitability for new equipment
- Size and recommend power conditioning apparatus: transient protectors, harmonic filters, isolation transformers, line conditioners, standby power systems, uninterruptible power systems, static transfer switches
- Document power system installation or problem correction requirements: drawings and specifications
- Design power systems for industrial or commercial data system facilities
- Test power system quality using harmonic analyzers, disturbance analyzers, oscilloscopes, digital volt-amp-frequency metering
- Procure equipment
- Interface with contractor installing equipment
- Inspect work performed and measure power system performance: regulation, common and transverse mode noise, harmonic distortion, panel loading and phase current balance

2. Grounding services

- Evaluate system grounding requirements: dedicated grounds, low impedance grounds, intrinsic safety grounds, logic grounds, lightning protection grounds, computer room isoplanar grounds (computer floor system or separate grid), AC system grounding, DC system grounding, specialized Telco grounding, input/output device grounds, data network grounds, etc.
- Investigate and remediate ground loop conditions
- Troubleshoot problems in existing grounding systems relating to input/output device instability, network problems, computer crashes, data corruption, AC line instability, equipment failures, etc.
- Evaluate existing site for grounding system suitability including measurement of existing ground system to the IEEE 81 standard where possible
- Recommend grounding system connection to power system, transient protection devices, intrinsic safety barriers, and new equipment
- Document grounding system installation or problem correction requirements: drawings and specifications
- Design new grounding systems
- Procure equipment
- Interface with contractor installing equipment

- Inspect work performed; measure impedance of ground system to IEEE 81 standards and measure impedance of connections to equipment and data highways; measure quality of connections in the grounding system
- Assure grounding systems are in compliance with applicable Intrinsic Safety system standards where required.

3. Ethernet network services

- Evaluate requirements for new networks or network expansions – design new networks or network expansions
- Troubleshoot problems in existing networks - provide solutions for problems found
- Network Analyzer analysis of existing network to monitor network activity in real time to determine protocols used, broadcast and multicasts, detailed utilization and error statistics, detailed packet analysis, etc.
- Determine network layout - Ethernet - including servers, gateways, bridges, repeaters, routers, hubs, switches, modems, copper or fiber cabling
- Document network system installation requirements: drawings and specifications
- Procure equipment
- Interface with contractor installing equipment
- Inspect work performed; measure all cabling (see item 4, "Cable testing services"), run network diagnostics; assure proper network functionality
- Look for ambient EMI/RFI (electromagnetic interference/radio frequency interference) that could affect communications.

4. Cable testing services

- Evaluate copper coaxial cable and connectors using laboratory grade high resolution metallic time domain reflectometer
- Evaluate twisted pair cabling and connectors using LAN cable testing devices
- Evaluate optical fiber systems using optical time domain reflectometer, power meter, and fiber microscope
- Prepare report detailing findings
- Make repairs to problems found

5. I/O troubleshooting services (analog and digital input and output devices)

- Investigate I/O field device problems (transmitters, Resistance Temperature Device – RTD's, thermocouples, motor starters, variable frequency drives, etc)and control system device problems (analog inputs and outputs, digital inputs and outputs, etc.). Issues investigated would include instability of measurements, incorrect measurements on calibrated equipment, high MTBF rate.
- Document findings
- Recommend fixes to include loop isolators, transient suppressors, regrounding of I/O devices, replacement of I/O devices, twisted pair-shielded cable, etc.
- Implementation of recommendations
- Verification of proper installation of recommended fixes; measurement of corrections to verify effectiveness of fixes.
- Intrinsically safe and non-incendive design of control system to field device wiring.

6. Lightning protection

- Investigate problems caused by lightning strikes
- Review existing lightning protection systems
- Design new lightning protection systems
- Recommend changes to existing lightning protection systems to mitigate problems caused by lightning strikes
- Compliance with NFPA 780
- Expertise in air terminal theory, dissipative air terminal technology, special grounding requirements for lightning protection systems

7. Industrial data communication systems

- Evaluate new data communications systems requirements or expansions to existing data systems. Data communication systems would include HART®, RS232, RS422, RS485, TIWay, Provox, Modbus, Modbus Plus, Modicon S908 (Remote I/O), Allen Bradley DH, fiber optic.
- Troubleshoot existing data communication systems problems - provide solutions to problems found
- Determine data communication system layout - including gateways, bridges, repeaters, routers, hubs, copper or fiber cabling
- Document data communication system installation requirements: drawings and specifications
- Procure equipment
- Interface with contractor installing equipment
- Inspect work performed; measure all cabling (see item 4, “Cable testing services”), run data communication system diagnostics; assure proper network functionality
- Look for ambient EMI/RFI (electromagnetic interference/radio frequency interference) that could affect communications.

8. ISO 9000 Internal Audits

- Perform audits on company processes to assure compliance with the ISO 9000 procedures in effect

9. Reliability services

- Perform field surveys and analysis to determine estimated failure rates for field installed hardware and networks (computers, input/output devices). These estimated failure rates are based on manufacturer Mean Time Between Failure (MTBF) data modified by environmental conditions. The field surveys include the following:
  a) Customer survey – what are perceived issues
  b) Measurement and observation of power, grounding, noise at every computer and I/O device
  c) Determination of Ethernet and industrial networks; measurement of error rates and types of errors and electrical noise as applicable
  d) Measurement of ambient conditions (temperature, humidity, vibration)
  e) Generate detailed report determining corrective actions for issues discovered. Assist with implementation of these corrective actions.

10. OSHA Safety Compliance

- Understanding of requirements of OSHA CFR 1910, NFPA 70, NFPA 70E, ISA RP12.6 (Intrinsic Safety), Factory Mutual Intrinsic Safety Standards, IEEE safety and electrical standards (Green Book, Emerald Book, etc.)

CONTACT INFORMATION:

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