

Beijing Subway Relies On EIG's Integrated Power Quality and Energy Management

OVERVIEW

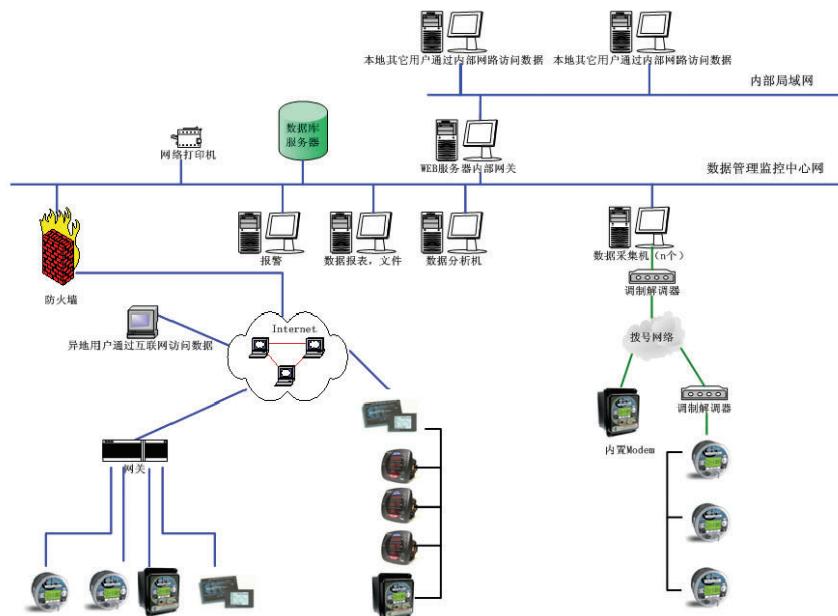
The Beijing Subway is a rapid transit rail network serving the urban and suburban districts of Beijing municipality. With an average of 3.4 million passengers a day; and consisting of 8 lines, over 200 km of tracks and 123 stations, the Beijing Subway is the busiest in China, and is second in length only to the Shanghai Metro. With this in mind, Beijing Subway was in search of an energy management provider that could provide them with the state of the art in technology and reliability. After extensive analysis, Beijing Subway standardized on EIG's solutions.



PROBLEM SUMMARY

The Beijing Subway lines 1 and 2 were designed and built in the 1960s. All of the lines' rectification and step-down substations have been supplied by the

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Project Thumbnail

Application

- Energy Manager EXT
- Nexus® 1272 Meters
- Nexus® 1252 Meters
- Shark® 200 Meters
- Shark® 100 Meters

System

- Architecture: C/S and B/S
- Data Acquisition System: RS485/Ethernet
- Win2003, HMI EXT, Windows XP, SQL Server 2000

Benefits

- Accurate data and information has enabled the Beijing Subway to better schedule trains and accurately calculate operating costs.





10kV city distribution network. The negative effects of subway train operation on the utility distribution network and neighboring utility clients has been increasing over time. In addition, poor power quality has been causing the subway system to experience multiple breaker trips and frequent equipment damage, and causes a high potential for malfunction of the more modern train signal and control systems currently in use. The power quality problems and low PF operation have cost the Beijing Subway substantive fines from the local utility, averaging more than 2.9 million USD per year. In addition, the Beijing Subway does not have access to any details of their energy consumption except for what is contained in the energy bills they receive from the local utility.

EIG'S SOLUTION

In 2005, EIG began implementing its Integrated Power Quality and Energy Management System, consisting of:

- Energy Manager Ext (Communicator Ext 3.0, HMI platform, AiReports)
- Nexus® 1272 Meters (Switchboard)
- Nexus® 1252 Meters
- Shark® 200 Meters
- Shark® 100 Meters
- Other universal communication equipment, servers, computers and terminals.



System Components:

1. Architecture: C/S and B/S
2. Data Acquisition System: RS485/Ethernet
3. Front-end Computer: Windows2000/XP and IPC
4. Communication Network: Ethernet-based intranet with routers and switches
5. Host and Rear-end: Database server, Web server, Alarm server, Trend server, Firewall
6. Software Platform: Win2003, HMI EXT, Microsoft. Net, C#, Asp.net, and SQL Server 2000
7. Terminals: Desktops, Laptops, PDAs

Power Meters

As part of the overhaul and retrofit for Lines 1 and 2 that began in 2005 to present, EIG installed 300 units of Nexus® 1252/1272 and Shark® 100/200 meters into the switchgears in over 40 substations in Lines 1 and 2.

Software

EIG and its local support developed and installed SCADA software for the management system application based on EIG's HMI EXT platform. The Software consists of 3 main modules:

1. Energy consumption: customized for the subway application, this module provides energy consumption and load profile information for all interchange points, every ride, and every period of time. It also provides essential information that has helped the Beijing Subway to better schedule trains and to accurately calculate its detailed operating costs.
2. Power quality: this module was designed according to China's GB standard and the IEC standard on power quality. It provides real-time readings, trends, logs, reports, graphs, and AiReports, helping the operators and engineers to monitor power quality at every point and to change operating mode as necessary to respond to power quality issues. It also provides

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- important information for troubleshooting problems and planning proactive maintenance of resources.
3. System management: this module provides management functions for the entire system.

RESULTS: HIGHLY PRAISED SUCCESS

The basic systems were put into service successfully in Lines 1 and 2. In 2007, the system was expanded and perfected, resulting in successful completion of the project. The systems have currently passed all inspections and have been accepted, as well as highly praised, by the Beijing Subway's Experts Inspection Team. This project serves as an ideal model of a successful power management system for the metro application industry.

配电站	调度号	2008-7-31	2008-8-1
西单	121	107	
西单	122	45	
西单降压	114	105	
西单降压	115	57	
西单	116	66	
西单	117	79	
天安门西	121	100	
天安门西	122	100	
天安门西降压	124	56	
天安门西	116	2002	
天安门西	117	100	
天安门东	121	465	
天安门东	122	67	
天安门东降压	123	67	
天安门东降压	124	67	
天安门东	116	67	
天安门东	117	67	
王府井	121	67	
王府井	122	67	
王府井西降压	123	67	
王府井西降压	124	67	
王府井	201	4543	
王府井	202	56	
东单	121	56	
东单	122	56	
东单东降压	123	56	

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FOLLOW-UP: EXPANSION TO BEIJING'S OTHER LINES

Based on the success of the project for Lines 1 and 2, in 2007 EIG began building similar power management systems for Lines 10 and 13, the Olympic Branch Line, the Airport Express Line and the Suburban Railway Line. These subway lines, in contrast with Lines 1 and 2, have been designed with a newer power supply structure, deriving their power from two 110/220kV substations, respectively, for each line, creating built-in redundancy. The newly implemented EIG power management systems performed successfully during the 2008 Olympic Games in Beijing, and have been operating problem-free.

FUTURE: SIX NEW LINES AUTOMATED USING EIG SOLUTIONS

The Chinese government announced a major economic stimulus package in November 2008. As a result, the Beijing Urban Planning Commission further expedited subway building plans, especially for surface light rails to suburban districts. In addition to the 8 lines currently in operation, there are at least 6 more lines with 164 km of track now under construction or scheduled to begin construction. Work on the six additional lines: Lines 7, 14, 15, the Fangshan Line, the Changping Line, and the Western Suburban Line are set to begin in January 2009. Overall, Beijing's rapid transit rail network is expected to reach 561 km in length by the year 2012.

With its proven record of success in implementing power management systems, EIG is well-positioned to develop and implement projects for the Beijing Subway system as new lines are added. In addition, EIG software currently in development will allow the Beijing Subway to monitor the operating conditions of all subway lines simultaneously, in the subway's control center.