Nefertiti in the Best Light

The Neues Museum in Berlin makes the development of the prehistory and early cultures of the ancient world understandable in a way that has never been seen before. A large proportion of the building technology comes from Siemens – from the electrical power distribution to the fire and intrusion protection.

In mid-October 2009, the Neues Museum in Berlin opened its doors again for the first time in seven years. The building, part of the World Heritage Berlin Museum Island and today owned by the Prussian Cultural Heritage Foundation, remained a ruin for decades after World War II and has now been elaborately restored. The costs of the restoration were around €200 million and were borne by the state.

The 8,000-square-meter exhibition space on four levels is shared by the Egyptian Museum and Papyrus Collection and the Museum of Prehistory and Early History, supplemented by objects from the Collection of Classical Antiquities. Both the Egyptian and the Prehistory and Early History collections now have approximately three times as much space as in their previous exhibition locations. Together with the Collection of Classical Antiquities, they have almost 9,000 objects on exhibit in the Neues Museum, including the world-famous bust of the Egyptian queen Nefertiti.

The architecture: “complementary restoration”

Top British architect David Chipperfield, of London, won the architecture competition to restore the building built between 1843 and 1855 according to the plans of Friedrich August Stüler, a student of Karl Friedrich Schinkel. Chipperfield’s “complementary restoration” avoided a literal reconstruction of the historic building as well as a modern encroachment upon the substance of the monument. The handling of the remaining parts of the old building in a way that is sympathetic to monument preservation, and the careful restoration of damaged parts in a contemporary architectural style, met with general approval. Chipperfield treated the preserved architecture like an archaeological object, so that it acts as an excellent stage for the archaeological collections.

Subterranean power supply ring for the entire Museum Island

As the provider of technical building services, Siemens was tasked with using high-quality products that, as far as possible, would not be visible to visitors. A majority of the technical systems were installed in the cellars beneath the water level of...
the Spree River. To enable this, the historic structure had to be prepared technically. Products from the complete Totally Integrated Power (TIP) system now ensure safe and reliable power distribution. A complex 10-kilovolt power supply ring connects all the museums on Museum Island underground. Local switch positions and performance and consumption data from all users and switching devices are fed to a data transfer point in the power centers of the individual museums via Profibus. This information is then transferred to the central power transfer station of Museum Island using fiber-optic cables. All the power data of the museums are visualized and archived there on a Simatic Touch Panel PC 677B. Via the OLE for Process Control (OPC) server installed on the PC, the 14,000 individual data points are converted and transferred to a central control center for the building control technology. If damage occurs, the medium-voltage ring is supplied via a 10-kilovolt / 630-kilovolt-ampere diesel generator. Due to the reduced short-circuit performance compared to online operation, selective switch-off parameters had to be guaranteed. To perform this task, the Sentron 3WL circuit breakers were upgraded with a communication interface and a trigger unit that can be switched via a parameter set. This means that under generator operation, the circuit breakers are switched to an adjusted parameter set. The control unit is a Simatic S7-300. The data are transferred to the peripheral local controllers as a Profibus log via fiber-optic cables.

**From medium voltage to low voltage**

In the Neues Museum, the medium-voltage ring feeds into a sulfur hexafluoride gas–insulated and, therefore, space-saving 8DH10 medium-voltage switchgear. The protection technology required is provided by, among other things, two Siprotec 7SJ relays. A Simatic S7-300 takes over the local control tasks of the fully communicative Sentron 3WL circuit breaker on the low-voltage side, and the 8DH10 switchgear on the medium-voltage side. The Simatic S7-300 is housed in a freely configurable Sivacon S8 field. To increase the operational security of switch operations in the medium-voltage ring, all the museum power stations were fitted with Simatic MP 377 12-inch touch devices. These visualize the switch positions of the peripheral medium-voltage ring cells and the local energy management data. The visualization software is WinCC flexible. The conversion to the low-voltage level takes place via two 1,250-kilovolt-ampere Geafol transformers that were acoustically isolated from the structure using oscillating elements and with additional housings. For safety reasons, the fire-load-reducing Sivacon 8PS busbar trunking systems were chosen to distribute the power from the transformers to the low-voltage main distribution boards of the general and the safety power supply. Thanks to excellent planning, this system enables space-saving power transport adapted to the structure down to the exact millimeter. No bending radii need to be considered, as is usually the case with cables. The rail feeder head, type tested together with the Sivacon power distribution board, is a further contribution to safe power supply in the building complex of the Neues Museum.

**Always informed about power consumption**

The safety-switch strips are equipped with a power management system. Each strip transfers the measured power values to a strip-specific bus system via integrated current transformers. These power data, just like the Sentron PAC3200 communication-capable multifunction measuring devices, transfer the consumption to the next-level control center via Profibus.
A clearly arranged distribution board transports the power to the Alpha installation distribution boards of the individual floors. In the porter’s office, the data from the lighting and shutter control are entered centrally and transferred to a higher-level control center via an OPC server. The lighting control in the entire building is visualized and operated flexibly using four Simatic Panel PC 677B 19-inch touch systems with WinCC as the visualization software. The electrical grid was planned using the TÜV-approved Simaris design dimensioning tool.

**Giving fire no chance**

Building Technologies was also assigned the telephone and data networks, the fire detection system, and the intruder alarm system. To supply the workstations and exhibition areas with telephone and data connections, the specialists laid a category 6 service-neutral structured cable network right up to the technical information connection box.

The Sigmasys Sinteso, compliant with DIN EN 54 and DIN 14675, is used as a fire detection system. In addition, 250 automatic and 50 manual call points, 30 wireless smoke detectors, and more than 60 smoke extraction systems were installed. In a fire alarm, potential-free contacts switch the control unit for the voice alarm systems, elevator controls, ventilator and automatic smoke filter systems, smoke and heat extraction systems, locking mechanisms, and sun shield systems. With 30 doors with locking mechanisms on-site, separate smoke extraction systems work as smoke alarms for monitoring the door areas.

**Uninvited visitors detected immediately**

In the Neues Museum, a CIC 3000 intruder alarm system with bus technology provides even more security. Monitoring is performed using magnetic contacts, breach monitors, motion detectors, laser scanners, and display case alarms. The individual areas are activated using two equal activation panels. Both the fire detection system and the intruder alarm system are connected to the higher-level danger management system of Museum Island in the Pergamon Museum with text and graphic displays.

A public address system with 450 loudspeakers allows both general museum operation announcements and announcements in the case of danger in the Neues Museum. The intercom control desk in the porter’s office, the door intercom terminals, the roof exits, and the elevator emergency call points are also connected to the control center in the Pergamon Museum. The terminals are displayed in the higher-level danger management system and can be operated from there.

All external and internal cameras and monitors for the video surveillance system are connected to a video control center in the Neues Museum. In the porter’s office, a multifunction control unit and six color monitors are installed in two rows. One of the two rows enables tracking of alarms from the video sensors of the external cameras and intruder alarms from the exterior security system. The middle monitor shows the images of the camera that triggered the alarm; the other two monitors show the images from the neighboring cameras.

**Video activation and recording for alarms**

Video cameras were installed at the visitor entrances in the foyer. During museum opening hours, they take close-ups of the visitors. Video cameras are also installed by the emergency

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*The 8DH10 medium-voltage switchgear is gas-insulated, thus saving space*

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exit doors at the north and south stairwells. These are connected to a monitor in the security control center of the Pergamon Museum when the bell push button, the emergency exit terminal, or the door handle (via antipanic lock) is pressed. To allow all the cameras in both the security control center and the Neues Museum to be used effectively, the routers of all buildings on Museum Island are networked with one another. The router of the Neues Museum is fully integrated into the video network of Museum Island.

Intruder alarm systems and fire detection systems are connected to the video surveillance system by potential-free contacts. When an alarm is triggered by the intruder alarm system or the fire detection system, the cameras that monitor the affected area and the areas to the left and right are connected as an alarm group to the alarm monitors at the gates of the Neues Museum and the security control center in the Pergamon Museum. The alarm images are recorded digitally. Thus the highest security measures imaginable are implemented at the Neues Museum.