Saint Petersburg Mertens House Panoramic Elevator

by Aleksey Gorilovsky and Stephan Kretzschmar

Mertens House Building

Mertens House has five levels and is the administration center for an adjacent department store. In 2007-2008, the building was totally refurbished and modernized to suit present office-space standards. Part of this project involved upgrading, modernizing and refurbishing the old lift.

The building is located in Nevsky Prospekt, the main avenue of St. Petersburg. The building was acquired by fur tradesman F.F. Mertens in 1871. In the 1850s, Mertens had a small shop at Nevsky Prospekt No. 50 and later opened his own retail shop in the Gostinny Dvor department shop. (The last one is also located

on Nevsky Prospekt.) In the beginning of the 20th century, the company "Trade House F.L. Mertens" (founded by Mertens) had its main facility in St. Petersburg and representatives in Riga, Latvia; Leipzig, Germany; Paris; London; Brussels; Berlin; and Nizhniy Novgorod, Russia. The current building is located on the plot where, originally, there was a two-story building. Then, that building was increased to four levels by architect A. Roben and, in 1911-1912, was rebuilt completely by architect M.S. Lyalevich.

Lift History

The Mertens House lift was installed by Siemens & Schukert Lift Co. when the edifice was rebuilt. The driving technology used was one-speed AC. The lift was driven by an operator. The old motor of the first gearbox was found in the machine

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Opposite page (clockwise from left):
- *The view from the bottom of the shaft*
- *The façade of Mertens House has had the same design throughout its history.*
- *The new drive*

This page (clockwise from top left):
- *The headroom had to remain this size.*
- *The modernized pit*
- *The old landing door*
- *The machine room before modernization in 2007*

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room in 2007 when the modernization survey was performed. An intermediate upgrade had been done in 1955, when an AC two-speed drive and a selective controller were installed. This elevator is one of the oldest in the city. It was installed prior to World War I and in operation until the end of the 20th century.

Technical Challenges

The age of the lift posed problems when considering today's Russian Federation codes and standards (PUBEL 2003) and attempting to safeguard the lift's antique appearance while giving it the latest technology. Also, the headroom and pit of the existing lift were too small to suit its new speed of 1.0 mps. The original wooden rails also had to be removed because of the speed increase. Since the lift cabin had to be kept, the available surface, when related to ruling codes, required an increase in the original capacity from 400 kg to 1000 kg. This had additional repercussions on the drive unit, counterweight, new safety gear and shaft structure.

The existing shaft was neither solid, nor fully enclosed. New codes did not permit wire mesh to be used for segregating the shaft from the stair house. All glass used in the cabin, doors and for decoration of parts of the shaft had to comply or be made compliant with modern regulations.

The headroom problem was solved by placing a safety pillar under the counterweight. When the lift is run under inspection control, the pillar must be swung out. The cabin top is secured by a curtain of light, which was cut out only after

This page (l-r):
- *The cabin door after renovation*
- *The interior of the old store at Mertens House*

Opposite page (l-r):
- *The top landing*
- *The modernized cabin interior*

swinging out the safety pillar under the counterweight, thus providing safe working conditions to maintenance personnel on top of the cabin. Owing to the safety precautions taken in lieu of the technical authorities granted an exemption for the shaft head.

The pit problem was solved by removing all obstacles like the pillar under the wooden guide rails and the impact concrete block under the counterweight from the pit. This provided enough safety space for workers in the pit, even if not keeping the dimensions of the safety cube.

The wooden guide rails were directly attached to the shaft structure. The new T-shaped guide rails had to be installed without using brackets. For compensating gaps, spacers had to be used. This was left in detail to the technical ability of the installing crew.

The overall shaft structure had to be analyzed in terms of being able to take up the new dynamic forces resulting from the increase of speed and duty load. The drive was designed for the new duty load and speed, since the distance between guides of the counterweight had to be kept. The balancing factor was reached by extension of the new counterweight frame and the use of lead fillers. The design of the new car frame and adjustment of the new safety gear needed to consider the fact that the old wooden cabin had to be retained. The shaft structure was recalculated for the new duty load and nominal speed, resulting in a difficult approach to the finite element model (calculations owing to the old materials of which the shaft is made).

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Specifications before Modernization

Duty Load: 400 kg

Speed: 0.4 mps

Travel: 17.56 m

Landings: 5

Cabin-door type: Manual double-leaf; no contact in cabin

Cabin- and landing-door size: 800-mm wide by 1,940-mm high

Landing-door type: Manual; opening to the left without door safety contact

Shaft: Self-supporting steel structure on H-beams, attached in the head to the building by a bracket

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The old mesh wire had to come off completely and be replaced by new wire that would fulfill the requirements of the Russian standard of 1992, when wire mesh was still allowed. This special exemption was found by the technical authorities in conjunction with the Russian State Historic Heritage Authority. All broken glass has been replaced and complies with ruling codes. Glass surfaces not broken were fitted from the back with a special foil to achieve similar properties to modern safety glass. The gaps between the single-shaft glass panels do, however, not comply with ruling codes, owing to the historic shaft appearance. Since the lift is used only by a limited number of persons, exemption could be granted for this deviation, as well.

Project Realization

The project realization had been split into two phases: the study and qualification phase, and order and realization phase. During the first phase, a site survey had been performed by which the next steps in engineering would have to be defined and a technical concept presented to the building owner. This was settled in 2006 and included the full structural calculations of the shaft and modernization

l-r:
- *The new controller*
- *The new landing operating panel*

Specifications after Modernization

Duty Load: 1000 kg

Speed: 1.0 mps

Travel: 17.56 m

Landings: 5

Cabin-door type: Manual double-leaf; no contact in cabin

Cabin- and landing-door size: 800-mm wide by 1,940-mm high

Landing-door type: Manual; opening to the left without door safety contact

Shaft: Self-supporting steel structure on H-beams, attached in the head to the building by a bracket

Above: The new wire mesh had to fulfill modern requirements.

equipment by an independent engineering center in Saint Petersburg, and the submittal of the calculations along with the safety concept developed by Stein Ltd. and LM Liftmaterial GmbH for the equipment to be modernized to the approval of the authorities in charge and the building owner.

The order from the building owner to Stein was placed in June 2007. Simultaneously, the new equipment was ordered from LM Liftmaterial. The new equipment was on site in December 2007. The installation crew worked over Christmas to keep its March 2008 deadline. The following steps were undertaken to meet it:

1) Start with basic masonry work in the machine room and pit.
2) Dismantle old equipment in machine room and get machine room refurbished for new equipment.
3) Remove old guide rails.
4) Take old wire mesh off and fit new wire mesh.
5) Fit new guide rails and counterweight.
6) Drive cabin down into pit and remove old car frame, place old cabin on wooden support and fit the new car frame around the old cabin.
7) Fit new drive and controller equipment into machine room, and fix new ropes.
8) Perform ancillary work on glass panels, and install new car- and landing operating panels in the cabin and at landings.
9) Get the lift mechanically ready.

The deadline was met, and the lift was handed over in May 2008.

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