

## Center of Competence IIEE, Efficient Energy Systems

### Supercapacitors for Elevators

#### Motivation

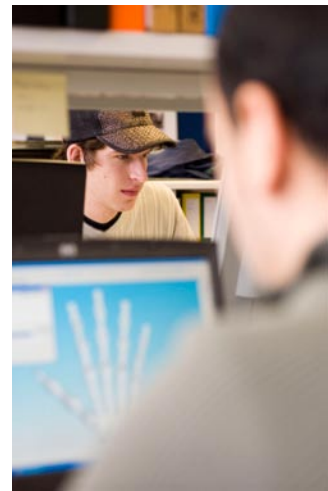
In principle, an elevator is nothing else than a vertically moving electrical vehicle. However, a conventional elevator system is not capable of storing recuperated energy during downward motion for further use. An elevator causes huge energy losses and very high acceleration currents. Supercapacitors are predestined to store large amounts of energy in a very short period of time and to release high currents on demand. In 1998 the collaboration between Schindler Aufzüge AG and the Institute of Electronics (IfE) started with the objective of reducing the acceleration current from the mains connection and of recuperating the braking energy of elevator systems.

#### Description

The first step of the project consisted in working out a concept for driving an elevator merely with the power of a Supercapacitor module. The concept was then successfully tested in a real elevator system. In a second step, we developed an entire simulation environment for the elevator system, including the Supercapacitor module. The simulation environment was used to design the controllers and electrical structures of a more refined Supercapacitor module. The resulting control and electrical structures were successfully implemented on a horizontal test bed. Finally, we examined typical examples of the Schindler elevator family. Based on this product clustering, a number of different solutions were rated with respect to their economical, technical and ecological aspects.

#### Results

Based on the developed structures and control schemes, the acceleration currents from the mains can be significantly reduced and the braking energy can be recovered in a very efficient way. An additional benefit of the Supercapacitor module is based on the fact that the Supercapacitor module is capable of supplying the elevator with sufficient energy for evacuating the cage over a distance of several floors in case of total power failure. The control structure inherently contains the possibility of an uninterruptible power system.



#### Projectname

Supercapacitors for Elevators

#### Projectpartners

- HSLU T&A  
- Schindler Aufzüge AG

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