English Summary

The documentation pertaining to the project executed is divided into two sub-reports.

Sub-report 1: Formulation of basic principles
Sub-report 2: Power-operated windows

The objective of the project executed was to work out and compile basic principles and knowledge regarding the integration of electronic or electromechanical components in the construction elements comprising windows, facades and doors. The specific issues to be investigated were finalised at the time of commencement of the project in cooperation with both the University of Biberach as the second research centre and industry partners. For this purpose the current weak spots were analysed and evaluated. Two main subjects were identified.

1. Issues, which are connected with the integration of electromechanical construction elements in the structure
2. Issues, which are connected with the integration of electromechanical components in the construction element

At the beginning of the project, the basic electrotechnical standards were analysed with respect to the issues to be taken into consideration with the integration of electronic components. In addition, the electrical and electronic components primarily used at present were analysed. For this purpose, an appropriate questionnaire was drafted with the help of which specific detailed data were collected from all project partners.

The options for running cables in construction elements were analysed and evaluated. To this end, first the “possible areas” for running cables were determined. Finally, criteria were obtained on the basis of which these areas were evaluated. The individual weighting factors were obtained with the help of so-called dominance matrices. In summary, it can be concluded on the basis of the analyses and evaluations carried out that the cables should be laid on the warm “unloaded” side of the room as far as possible. In the process the principle of implementation of separate installation zones can be made use of. With this the design of the complete window or facade can be worked out and finalised.

Another focus was the listing of important detailed points that must be taken into

consideration with the integration of electromechanical components in the building. For this purpose the implementation of the planning and execution process of a facade or window design was analysed on the basis of the individual stages of the HOAI (Honorarordnung für Architekten und Ingenieure, Fee Structure for Architects and Engineers). The important details were obtained and compiled for the respective phases of planning. Recommendations for the solution and implementation of specific issues were worked out. In this manner, an “identification key” was developed on the basis of which the point of handing over between the two trades, the construction element and the building services (e.g. electrical installation) can be determined. Appropriate recommendations were worked out here too for the purpose of practical implementation. Apart from determining where the handing over takes place, it is also important that a clear “handover” takes place of the functions of the outgoing cables from the construction element. Towards this end a “colour key” was established together with all project partners, which permits simple and practical identification of the “functions” of the individual cables. The recommendations worked out within the framework of these investigations as well as the general detailed issues, which must be taken into consideration in the context of the planning, have been summarised in a separate set of ift guidelines.

Investigations were carried out with respect to electromagnetic compatibility on a demonstration unit prepared within the framework of this project. In the course of doing so it was demonstrated that the window element installed for testing complied with the EMC guidelines for all standards with respect to which it was tested. There was an adequate factor of safety to the limit values of class B for residential areas and an even larger one for class A for industrial environments. The components used in the window element are assessed as being EMC compliant. Since the window element will be connected with one more or less intelligent controller, the selection of the controller and the required cabling is of prime importance. The measurements confirmed that the interference spectrum emitted by the controller and conducted by the cabling overlaps the low emission values of the window functions.

The tests and investigations carried out within the framework of the project as well as the presentation of the results are illustrated in sub-report 2.