

ASSEMBLY + DISASSEMBLY OF INTERIOR WALL

by

Dipl-Eng. Albrecht Hanser

*Technical University Munich, chair of building realization + -informatics,
Prof. T. Bock Arcisstrasse 21, D 80333 München,
albrecht.hanser@bri.ar.tum.de*

Abstract: Flexible extension walls - watched on a long-term-use - have lower costs and are more economical and especially more variable compared to convenient post-and- beam-structures. Because room requirements – mainly in office and administration building – change faster and faster, an extensive potential on future markets for these technologies exists

Keywords: Flexibility, Economic Efficiency, Non-supporting removable wall-unity, Media- and electric wiring, Put-and-slide-technology, Relocate systems, Cost, Different Elements,

1 INTRODUCTION

Flexibility

A higher and higher flexibility of the floor plan is expected in office- and commercial building as in house building. The change of users or function often results in the wish redesigning the existing spatial pattern. A basic floor plan flexibility often is possible and practiced by dividing the load-bearing building surface from non-structural separation walls and ceilings. A well known system of this type of walls is a wooden or metal post-and-beam-structure with mineral fibre filling and plasterboard panelling.

By using this building system it is difficult to realize variations of different room structures and subdivisions by self building. In fact they are cheap to produce and to install but in the end they are much fuss in redesigning, few flexible and actually not reusable. In addition there are already reusable, demountable partition systems available. However they usually are to expensive and to much fuss to construct.

Economic Efficiency

All partners in construction business know exactly what construction cost mean. Very

often we think and act only in this kind of category.

The reason for this understanding is the existence of two different budgets; one for construction and a second for consequential costs during life cycle, which are even managed by two teams. Feedback between the two will almost not occur. So at the end in a life cycle of a building, nobody is able to find out the real cost situation which has been followed after construction time, of a product incorporated in the building. Even what the savings could have been, we cannot find out, in case we would have constructed in prefabricated and modular systems.

Indeed thinking in a complex overall view, we are realizing where the advantages are for prefabricated and relocate-partitions:

- Connections with its components, seperations in floor- and ceiling-areas are close in cost of these construction types.
- The finishes of partition-walls, out of gypsum board, assembled on site, have not this standard of quality as industrial prefabricated partitions. Prefabricated partitions need no new coatings for 30 years, as conventional gypsum boards need it all 5 years.

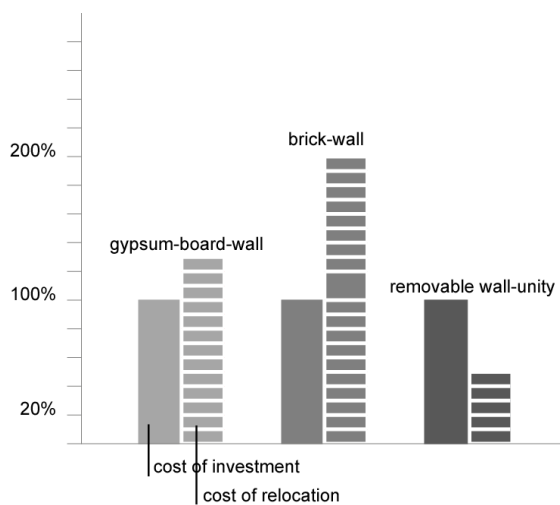
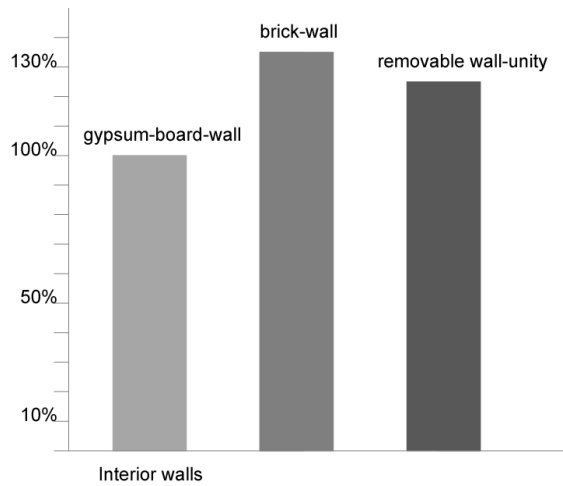


Figure 1: interior walls: cost of investment and relocation (1)

- In case prefabricated partitions get relocated, the difference in investment cost becomes obvious. A prefabricated partition occurs 40% of its former construction cost, while a conventional partition, which has to be demolished and reconstructed almost completely new, occurs 220% fit. It is beyond any doubt, the payout-return depends on construction type of prefabrication and the amount of relocations.
- Recovery and cleaning up belong to an ecological and economical overview; in this context relocate systems offer advantages. Savings of material and avoidance of waste have no exceeding fees for supervised dumps. These cost have been augmented constantly the last years.

2 AIM OF THE PROJECT

It was valid to develop a non-supporting removable wall-unity, which allows adaptable, fast and disassembling room-splitting.

Next to the standard components we have to develop elements for the connection at the existing support structure, elements for passages and doors, for windows on the inside and other glazing structures.

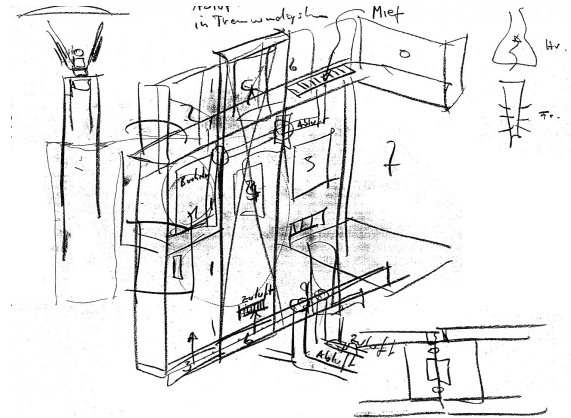


Figure 2: First sketch (4)

Media- and electric wiring are components of the removable wall-unity. The elements are delivered prefabricated and manageable on the construction site.

The connection to the available supportstructure is created with a stretching mechanism (Justix); the coupling of the elements and also the management of media- and electric among each other works with a put-and-slide-technology.

3 DEVELOPMENT

Demands to the system

- "More than a wall", which means integrated media, such as TV, phone, flat screen, switches, bus, safe, mini-bar, shelf-systems, cupboards, etc completely connected up;
- Demountable and reusable and without damaging the existing solid construction;
- With finish-surface on both sides, in complete lightweight construction;
- For two persons to handle and to install
- Simple construction and long-term use
- Located in price between the plaster board/post-and-beam-structures and the conventional wall systems.

“More than a wall”; beside separating for offices, administration or housing the wall unit is supposed to serve as room divider semi high screen wall or fair stand.

Put on wheels it can even become a mobile office wall.

One of our aims is to see the wall not only as a separating element between two areas, but to include additional functions such as screens lights, mini-bars, shelf-boards, integrated air-condition, etc; even PC or printer can be hidden in the wall;

4 ELEMENTS

Surface finished, easy-to-handle modules are basic for interior wall surfaces.

Elements are:

- Room-high elements (size depending on height of the ceiling, standard sizes)
- Door high elements (height 210 cm)
- End elements above door high elements (size depending on height of the ceiling)
- Elements for easy zoning, separating areas (height 105 cm)
- Special elements

5 CONSTRUCTION

The substructure for the single module is supposed to be a circulating frame. Panel materials for wall surfaces like wooden panels, plasterboards, glass etc. serve as frame bracing.

Wooden profiles but also special formed plates can be the frame material.

The connection to the load bearing wall construction and to the ceiling is designed as edging board.

The gap between the bottom of the wall an the floor is covered by a clipped baseboard. A dovetail-similar joint with integrated plugs for power and data supply connects the single elements among one another and to the load bearing walls.

The single modules therefore are coupled by

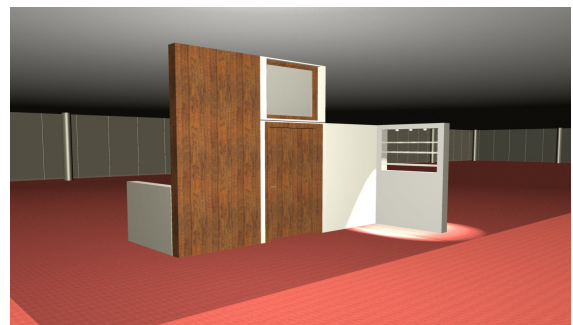
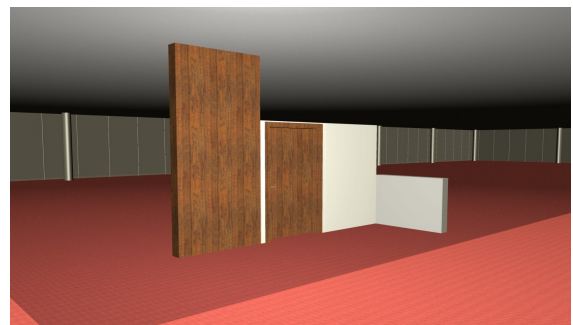
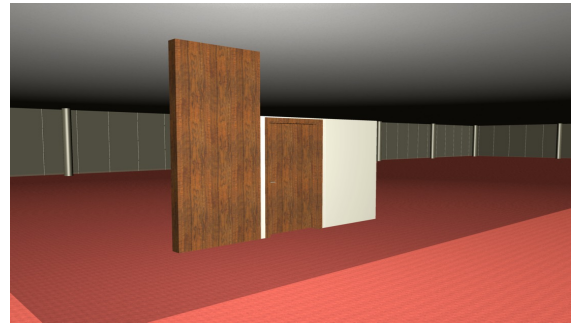
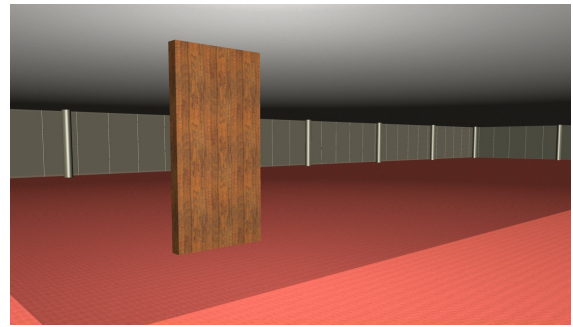


Figure 3: Simulation of the elements (4) fitting an pushing the connecting elements

The single modules therefore are coupled by fitting and pushing the connecting elements together. The stack design is variable.

Door high elements and end elements are connected in the same way. A special processing of the frame profiles makes it possible to carry the prefabricated electronic wires through the element.

The contact from element to element gets possible through the just mentioned connecting modules. The necessary fitting in to surround construction could be succeeded by vertical adjustable foot construction. There are two for each wall panel. After connecting the elements the foot construction is screwed up and pressed against a connecting profile.

The rising gap at the bottom of the wall can be used for supplementary wires – especially for wire systems, that can only be added restrictively (phone, networks). A clipping profile as baseboard covers the open bottom area. There must be sound and fire technical measures on the surface, in the stack area as in the base and ceiling area.

6 FABRICATING PROTOTYPES

There are running parallel extensive tests with prototype wall modules to transfer the gained knowledge practical.

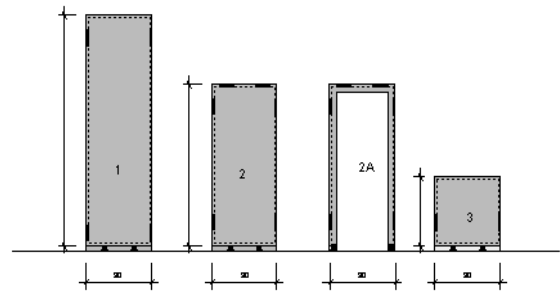
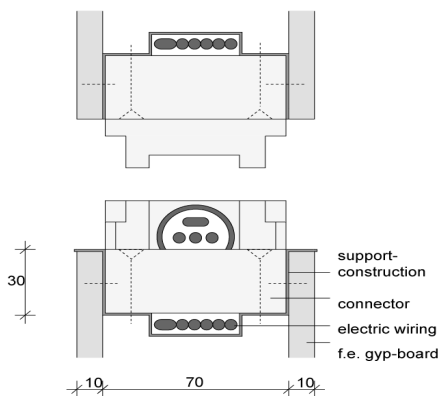


Figure 4: The elements; dimension: 90cm wide, 300cm, 210cm, 90cm high; the connecting system (4)

7 CONCLUSION

The system shown in this paper will find place between the low cost but not reusable gypsum board partition-walls and the industrial prefabricated partitions, which are very expensive. The combination between a prefabricated high tech system, affordable and economical, usable as flexible elements for different tasks are the main advantages of the new system.

REFERENCES

- (1) Studiengemeinschaft Fertigbau (1987). Trennwandsysteme
- (2) Tichelmann / Pfau (2000). Entwicklungswandel Wohnungsbau, Vieweg, Wiesbaden
- (3) Diverse Herstellerunterlagen: Lindner, Knauf, Item, Dorma, Häfele, Strähle, Hettich, u.a.
- (4) all figures: Technical University Munich, chair of building realization; except figure 1 which belongs to reference (1)