

# NEW CHANCES FOR MODERN EARTH BUILDING

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## **Introduction:**

Earth has been a tried and tested natural building material for thousands of years, and in combination with modern techniques can be used for modern ecological buildings. This paper will describe the development of earth building in Germany and discuss finally the new chances of modern earth building. Additionally, the paper will briefly review the evolution of earth building in Germany, it will describe the technical development of earth building products and the next steps for a future dissemination.

## **The history of earth building in Germany:**

Earth building in Germany has a long tradition. The oldest framework house with earthen interior in the region of Berlin-Brandenburg was built in 1408 in the Brandenburger Bäckerstraße (*KirchBauhof 1998 : 214*). In the 18<sup>th</sup> century the construction of earthen architecture was very widespread in Germany. In this period especially David Gilly had a big influence on the development of earth building in Germany. The oldest still existing rammed earth building was built 1795 in Meldorf, Schleswig-Holstein. The owner wanted to show that rammed earth as a construction method is much more fire resistant than traditionally built framework houses. The aspect of fire resistance was one reason for the introduction of earthen architecture in the 18<sup>th</sup> century in Germany. The highest rammed earth building of middle Europe we can find in Weilburg an der Lahn (constructed in 1828). This rammed earth building has 5 floors and it symbolises not only the durability of earthen architecture but also documents the possibility of constructing higher than 2 floors when operated with the rammed earth building technique.

During the industrial revolution at the end of the 19<sup>th</sup> century constructors didn't use earth any more as a building material. Only in the period between the two world wars, when building materials were rare, we can remark the reuse of earth as a building material. While we can interpret the reasons for the use of earth in the 18<sup>th</sup> and 19<sup>th</sup> century as a form of reduction of forest overexploitation, we will find financial aspects for the use of earth as a reason after the second world war; that means especially the reduction of building costs (*Minke 1997:16 f.*).

After the second world war the inhabitants in the eastern part of Germany (GDR) used earth as a building material again, because they had no other building products and of course no financial resources. In the western part of Germany (GER) we can observe another ideological background for using earth in the eighties of the last century. It was the background of the ecological movement and the aim to get a better and proper world without pollution, which was the reason to look for environmental friendly building materials. In this period some enthusiastic alternative groups emphasised the importance of recycling, which also is a very important aspect of building materials or building waste. Nevertheless those individualists and alternative groups have been the pioneers of one of the following eras – the so called “renaissance of earth building” in Germany.

**The renaissance of earth building:**

For a couple of years earth building techniques have been growing in Germany and all over Europe. The reason for this increase is the interest in ecologically friendly construction. Another reason is the growing dissatisfaction with the results of conventional constructing methods. We can observe a renaissance of earth building in Germany since the end of the nineties. The increasing interest in healthy working and living rooms, rural methods of rehabilitation and the increase of allergies are only a few reasons for this development. Between 1990 and 1996 for example in the region of Berlin/Brandenburg there was a use of earth building products in more than 85 buildings (*Rüger 1998 : 66*). While in the eighties it was a group of idealists who used earth as building material, in the nineties also “normal” people were interested in the positive effects of earthen architecture. But earth building only developed slowly in Germany, because it still was a construction method for individualists and the costs were still very high. A lot of architects, constructors and craftsman had no knowledge and experience with the usage of earth building products in new and actual buildings.

**Healthy living:**

At the same time there is both an increase of new earth building products and technical developments in the production of this sustainable building material. As one consequence there are now a lot of new products available on the market. Since people “re-recognised” that it is possible to use earth as a building material they are more and more interested. We know constructors who built houses conventionally with cement, but after they read an article in a magazine or watched a report on TV about earth construction, they now are interested in the new earth building products. The market of new earth building products is increasing and

various pre-fabricated products are now available in a lot of different sizes. Also the first steps of certification of earthen plasters are done. Especially the combination of a earth and wall-heating-system is increasing, because people have heard of the positive and healthy effects of earthen products. The advantage lies in the different usages of heating and cooling systems.



*Picture 1: Preparation of a wall-heating-system*



*Picture 2: Earthen plaster on a wall-heating-system*

Another big new market for urban housing projects lies in the use of earthen plasters. They are available in natural earthen colours as well as in a lot of other colours. On the one hand we find healthy reasons and on the other hand esthetical reasons for using earthen products.



*Picture 3: Earthen plaster for a favourable room climate*

### **Protection against electromagnetic radiation**

New research studies showed that earth is better than any other building material (e.g. brick, calcareous sandstone or concrete) to protect human being against electromagnetic radiation. On behalf of the Building Research Institute of the University in Kassel, the Universität der Bundeswehr in Munich made a comparative analysis between different construction materials and found out that an earth building with a green roof has a shield of 99,9 % (*Minke 2002 : 110 f.*).

**Social housing projects:**

Some project developers and architects developed new social projects. A combination of ecological and social housing projects have been developed in the past years. Unskilled workers were added to the construction team to provide additional labor and to train the team in the techniques. The effect is that former unemployed people get qualified in ecological construction methods and achieve a better chance on a harder getting job market through the new skills.



*Picture 4: A vocational training in earthen plasters*

**A building-material with a certification:**

A new dimension for further research studies lies in the certification of earth building products. A lot of people in Germany buy earthen products because they believe in its healthy quality. In 2002 the Technical University in Berlin made a comparative analysis between different mortars and found out, that not all earthen plasters are better than conventional mortars. Holl and Ziegert (*Holl/Ziegert 2002 : 91 ff.*) found out that the steam sorption of earthen plasters is very different. Some plasters have a steam sorption which is about 3-4 times higher than conventional mortars. In the sense of consumer protection it is necessary to develop a method to standardise earth building products; for example the sorption of earthen plasters. Otherwise the consumers could get uncertain and no longer use earth building products as a construction material. The analysis of material values and building elements is the first step for the development of a standardised method. Especially the producer of earth building products should have an interest in a certification of their products, if they want to exist on the market.

### **Earth Building – a new market?**

The prospects for an earth building market in Germany are good and we can observe a tendency that the expansion of earth building also takes place in new areas where earth building doesn't have a historical background. In Germany over 50 enterprises exist which produce different kinds of earth building products for new building, interior construction and rehabilitation. More and more we can observe that large enterprises are interested in the production of earth building products.

### **Sustainable construction:**

Within the framework of urban renewal and urban development is the promotion of a sustainable development by a combination of economic, ecological, sociocultural and technological factors to be reached. The key for a sustainable development of buildings which have to be refurbished as well as new utilised, lies in the correct answer of the question of utilisation. A new utilisation of refurbished buildings (e.g. churches, factory buildings) can exist on a long-term basis only by taking into account urban-sociological and local-specific conditions as well as the economic circumstances on the spot. A new utilisation is to be understood in this respect as a social process, which includes the involved participants in the planning process. At the same time construction measures must be implemented if necessary ecologically and technological innovatively, so that the building can be pursued in the following as resources-careful as possible.

The preservation and refurbishment of existing buildings is often ecologically more sensible than a new building. Finally an ecological refurbishment draft symbolises the linkage of ecologically oriented technologies with the obvious preservation of historic structural fabric up to care of monuments. The refurbishment and preservation of the building also includes social aspects, because the surrounding field is a component of the urban planning change process. Finally with the ecological re-utilisation of buildings a demonstration object appears which symbolises the integration of modern ecological technologies - for example passive solar energy or ecological building materials - in a heritage monument.

### **Dissemination of earth building:**

In the mid nineties a small group at KirchBauhof – they were one of the largest employment and qualification enterprises in Berlin, which went bankrupt in 2002 - thought about the idea to start a project to support small and medium sized enterprises (SME) of the building sector. To support planners, manufacturers and merchants of building materials, construction companies and initiatives committed to earth building, to promote communication between

the protagonists, to inform the specialised public and to present earth building as a modern, sustainable and payable alternative to future builders. The idea was to offer unemployed handcrafts a qualification in ecological building techniques (e.g. earth buildings, ecological colours) and to organize a platform to enhance the market for ecological construction in the region of Berlin-Brandenburg. These activities were linked with the promotion of earth building by the European project ADAPT-TREAT which KirchBauhof carried out along with further EU-partner projects. In 1997 KirchBauhof organized the 1<sup>st</sup> European conference “Modern Earth Construction” in Berlin and a small earth building fair. The result was a conference with about 200 participants, a web presentation and a book (including a CD-ROM). For the dissemination of this ecological and modern technology it is important to document the new developments in earthen architecture. Books dealing with the different techniques of handling earth as a renovation and building material is one instrument to enhance the knowledge about earthen architecture. Meanwhile earth builders from all continents come to Berlin to get new international contacts and develop new projects. To enhance modern earthen architecture it is important to make this construction method popular. Indeed events like conferences, exhibition and fairs are an ideal media. The public notices these events and is getting more and more interested in this way of construction.

The aims of the future is to enhance the dissemination of modern earthen architecture and start a broad network of people who share a common vision of a sustainable world and who are actively working to make it happen.

**References:**

- [1] KirchBauhof: Modern Bauen mit Lehm, Berlin 1998
- [2] Minke, Gernot: Lehmbau-Handbuch – Der Baustoff Lehm und seine Anwendung, Staufem 1997
- [3] Ruger, Burkard: Seit 1980 in Berlin/Brandenburg ausgefuhrte Lehmbauvorhaben; in: KirchBauhof, Modern Bauen mit Lehm, Berlin 1998
- [4] Steingass, Peter: Moderner Lehmbau 2002, Stuttgart 2002
- [5] Minke, Gernot: Schutz gegen hochfrequente elektromagnetische Strahlung durch Lehm- und Gipsbaustoffe und Grasdacher; in: Steingass, Peter, Moderner Lehmbau 2002, Stuttgart 2002
- [6] Holl, Heinz-Gerd/Ziegert, Christof: Vergleichende Untersuchung zum Sorptionsverhalten von Werk trockenmorteln; in: Steingass, Peter, Moderner Lehmbau 2002, Stuttgart 2002
- [7] Steingass, Peter: LEHM 2000, Berlin 2000