



Decorative Plasterwork at Volvveti Manor

—Sustainable Heritage Report No. 6

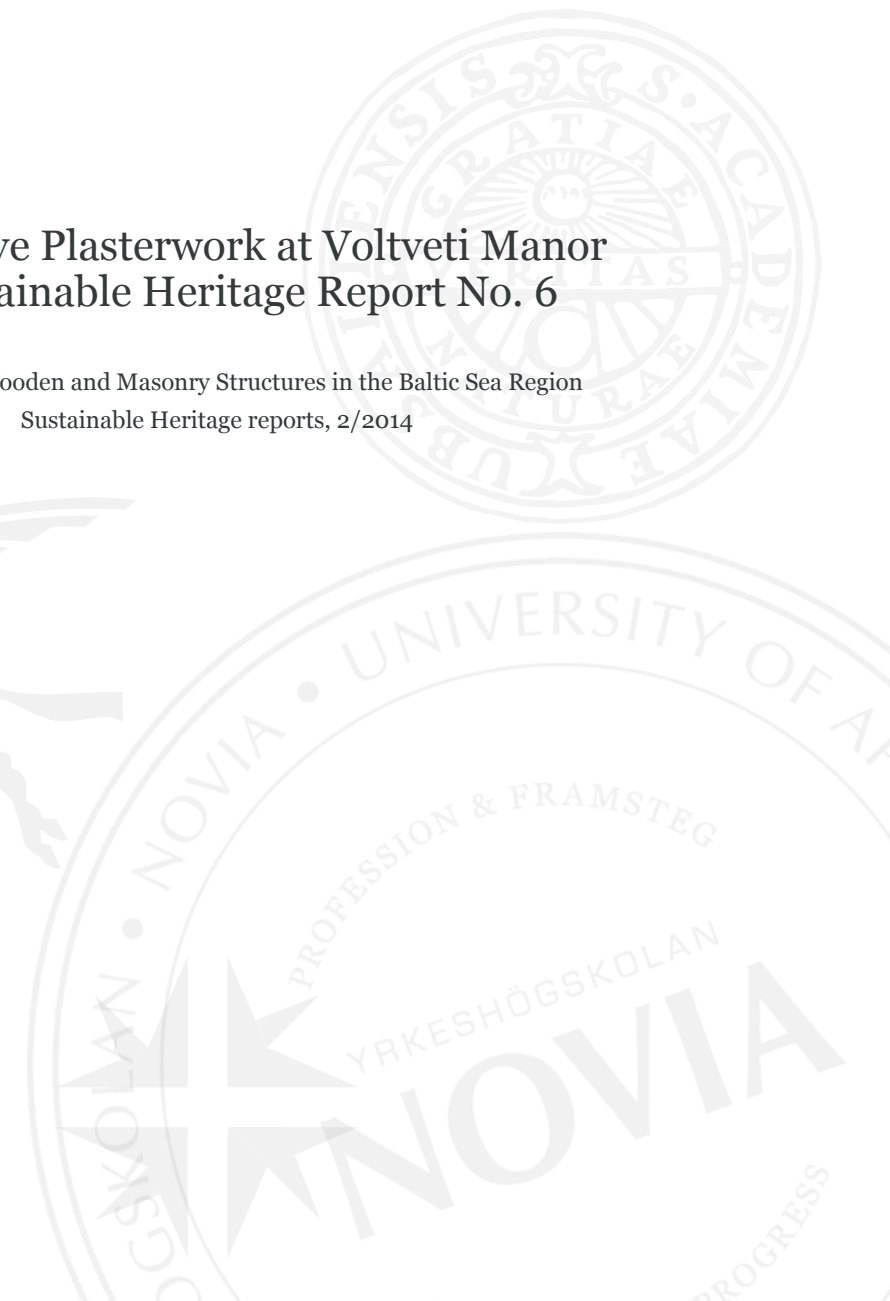
Kirsti Horn, editor

Traditional Wooden and Masonry Structures in the Baltic Sea Region
Sustainable Heritage reports, 2/2014



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2

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Kirsti Horn, editor

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Estonian Academy of Arts, Novia University of Applied Sciences and supported
by the Nordic Council of Ministers through Nordplus funds.



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Contents

Summary	5
Preface	7
Part 1: Background to the art of decorative plasterwork	9
1.1 Stukkdekoor, stuckatur or simply ‘stucco’?	9
1.2 The role of decorative plasterwork in interior architecture	10
1.3 Short history of decorative plasterwork in Estonia, Sweden and Finland	14
1.3.1 Estonia	14
1.3.2 Sweden	16
1.3.3 Finland	18
Part 2: Learning to restore decorative plasterwork at Voltveti Manor	19
2.1 Introduction to the site	19
2.2 Things to consider when planning a restoration site indoors	20
2.2.1 Protection and cleaning of surfaces	20
2.2.2 Site security	21
2.2.3 First aid	21
2.2.4 Fire hazard	21
2.2.5 Storage	22
2.2.6 Timetable	22
2.3 Common damages to decorative plasterwork	22
2.3.1 Typical problems caused by dampness	22
2.3.2 Typical problem caused by changes of temperature	23
2.3.3 Other typical problems with historic plasterwork	23
2.3.4 Damages of the decorative plasterwork in Voltveti Manor	24
2.4 Repairing decorative plasterwork at Voltveti Manor	26
2.4.1 Paint removal	26
2.4.1.1 Mechanical paint removal	26
2.4.1.2 Paint removing compresses	28
2.4.1.3 Paint removing chemicals	28
2.4.2 Repairwork	29
2.4.2.1 Repairing minor defects	29
2.4.2.2 Taking moulds	31
2.4.3 Running a mould	41
2.4.4 Surface treatment of decorative plasterwork	47
2.4.5 Fixing a plaster ornament	49
3. Conclusions	51
References	53
Appendices	55
About Estonian Academy of Arts	58
About Campus Gotland, Uppsala University	60
About Novia University of Applied Sciences	62

Summary

This report is about interior decorative plasterwork of the past centuries and about the restoration work performed at *Voltveti manor* in Estonia (figure P1). It is not about straightening masonry walls or giving façades a distinct style but instead, of the delicate architectural decorations that can be found inside palaces, manor houses and churches of the past centuries. The report is largely based on what was learnt during the intensive course. The results of this are two: obviously the reported learning, but also the fact that this was another small step towards the rescue of an historic interior of notable character and detail.

Several aspects of decorative plasterwork are dealt with. These have been divided into two sections, namely *Part 1* which gives general background information concerning the material and its use over the times, and *Part 2* describing the most interesting practical restoration work that was performed during the intensive course at Voltveti manor. The step by step photographic documentation illustrates the performed work in a fascinating way.

The excellent cooperation between the involved universities, namely *Estonian Academy of Arts*, *Uppsala University* and *Novia University of Applied Sciences* has once again given their students a wonderful opportunity to learn about the architecture of the past and the way it should be restored and maintained. All participating students have contributed to this report with text and photographs.



Figure P1. View of the manor from its park. Photograph by Triin Jänes.



Figure P2. Heiti Kulmar and Maria Väinsar. Photograph by Michael Diedrichs.

Preface

More than 30 students and eight teachers from *Estonian Academy of Arts*, Estonia, *Uppsala University, Campus Gotland*, Sweden, and *Novia University of Applied Sciences*, Finland, took part in the third intensive course in the series *Traditional Wooden and Masonry Structures in the Baltic Sea Region*. During the first week of September 2013 the scene of the event was the historic *Voltveti manor* in Tihemetsa, Pärnu County, Estonia.

The project **Traditional Wooden and Masonry Structures in the Baltic Sea Region** is supported by the Nordic Council of Ministers through **Nordplus** funds. It is designed for students of building conservation, conservation of artefacts, structural engineering and site management from the named universities in Sweden, Estonia and Finland. The idea is to give them the opportunity to learn about the traditional materials in different parts of buildings. From the conservation point of view they learn how constructions and surfaces made of these materials are to be preserved in the best manner. The extra bonus is that when students of different disciplines meet, they naturally exchange ideas and experiences and they develop contacts across cultural, national, professional and language barriers.

We thank **Krista Laido** from Estonian Academy of Arts for the excellent arrangements. Many thanks to the leaders of the Forestry school that is situated in the building for letting us work in their representative rooms and the Pärnu County Heritage authorities, **Nele Rent** in particular, who gave us permission to perform the work. Thanks also to **Hilkka Hiiop** and **Joosep Metslang** for interesting lectures and excursions.

We want to extend our special thanks to our knowledgeable tutors **Maria Väinsar** and **Heiti Kulmar** who shared their expert knowledge in the art of restoring decorative plasterwork with us.

Kirsti Horn

Senior lecturer, Architect SAFA, AA Dipl.

Part 1: Background to the art of decorative plasterwork

1.1 STUKKDEKOOR, STUCKATUR OR SIMPLY 'STUCCO'?

Stucco is a term which is used in several different ways. In American English the word is generally used for a finishing coat of gypsum plaster or lime plaster, or rendering with lime or cement. Yet, it is also used to describe decorative embellishments, sculptural details and figures made of gypsum or lime plaster in architecture. Furthermore, Stucco is a description of the ingredients in the plasterer's bucket and a general term for the result after the mix has been applied onto the wall or ceiling or after it has been modelled into an architectural decoration. The word is Italian and it was spread throughout the countries north of Italy by the many masters of the craft who were employed on the building sites of the wealthy from France to Sweden in the north and Russia in the east. The exact meaning changed over the years because the plastering and decorating technique developed, and the used materials varied with times and location. The definition of stucco according to Encyclopedia Britannica is the following:

“stuccowork, in architecture, fine exterior or interior plasterwork used as three-dimensional ornamentation, as a smooth paintable surface, or as a wet ground for fresco painting. In modern parlance, the term is most often applied exclusively, especially in the United States, to the rougher plaster coating of exterior walls.”

To avoid confusion of the vocabulary, this report is about **decorative plasterwork** (see appendix 1, terminology).

The decorative pieces of plaster can either be made in situ by a plasterer or pre-fabricated by casting in a workshop. The material for the former would traditionally have been lime plaster, gypsum plaster or a mixture of these, while the latter is made of gypsum plaster.

Lime and lime plasters are discussed in no. 1 of the Sustainable Heritage

publications called *Lime Rendering* (visit <http://www.sustainableheritage.fi/courses/index.php/publications>).

Gypsum is lime that is naturally bonded to sulphur and water. Its chemical formula is $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. When the material is to be used for plaster, the water must be distracted through burning the stone. This results in a powder which returns to its original chemical formula when water is added to make a paste or plaster for sculpting and casting. Gypsum plaster is easy to work and hardens fast. Lime and other additives are often added to make the hardening slower. Gypsum is a fire-proof and odourless inorganic building material that can be used both indoors and out-of-doors, even in the Nordic climate as long as it is kept dry.

Decorative plasterwork can be found in many different contexts. This report deals with its use in architectural detailing inside historic buildings, but it can be found as a decoration on façades, antique furniture, frames around mirrors and paintings, and small *objects d'art*. In those cases the plasterwork is often gold-plated or gilded through some less expensive method, or made to look like different materials, mainly stone.

1.2 THE ROLE OF DECORATIVE PLASTERWORK IN INTERIOR ARCHITECTURE

Gypsum or lime plaster was used for bas reliefs and sculpture already in ancient Egypt, the Middle East and in antique Greece and Rome but then largely forgotten during the Middle Ages in Europe apart from Germany and Silesia. Its use lived on in the Islamic world where architectural masterpieces were often covered in lime plaster and decorative plasterwork inside and out. There are two notable examples of this in southern Spain, the palace of 14th century Alhambra being the more famous and one of the first UNESCO World Heritage Sites (figure 1.1).



Figure 1.1. Detail of plasterwork with Islamic themes that cover the walls and ceilings of Alhambra Palace. Photograph by Kirsti Horn.

In the European culture many architectural details which during the Antique times were made of marble were substituted or supplemented with elements of plasterwork already in the monumental building projects of Italy and France during the Renaissance period (AD ~1350 to 1550). The most elaborate examples of this kind of decoration date back to the following architectural eras in the 17th and 18th centuries. New artistic heights were reached in some Baroque and Rococo churches and palaces throughout the continent.



Figure 1.2. The cornice of the ballroom in Voltveti manor consists of three lines of decorative plasterwork and trompe l'oeil painting with consoles, putti and garlands in between. Photograph by Kirsti Horn.

Decorative plasterwork was used as a means for making optical illusions in Baroque and Rococo interiors. The plaster putti, pompous mouldings, medallions, garlands and copies of antique detailing were used as a link between architectural elements and illusionistic ceiling paintings that made *trompe l'oeil*, or deceiving the eye, possible (figure 1.2). Ceiling paintings create the scenery (sky with clouds and figures, for example) and the imaginative plasterwork frames it with architectural essence and figurative compositions which seem to grow out of the walls (figure 1.3).



Figure 1.3. Baroque and Rococo themes can be detected in the plasterwork detailing at the magnificent Kadriorg Palace in Tallinn. Photograph by Kirsti Horn.

The refined Classicistic interiors of the late 18th century derive their inspiration from the antique Roman interiors that were discovered under the ashes of Mount Vesuvius in Pompey in the 1750's. The decorative plasterwork still plays an important role in the architecture, but the ornaments are rather subdued to the overall design and they are mainly flat and symmetrical like their antique models.

In the 19th and early 20th century during the Jugend and Classicistic revival architecture, very detailed plasterwork was still used to decorate the home interiors of the upper class and aristocracy until the phrase "ornament is crime" was introduced to support the sober ideas of Functionalism.

1.3 SHORT HISTORY OF DECORATIVE PLASTERWORK IN ESTONIA, SWEDEN AND FINLAND



Figure 1.4. The banqueting hall of Kadriorg Palace in Tallinn dates back to the early 18th century. Photograph by Kirsti Horn.

1.3.1 ESTONIA

Starting from the 18th century, the manors of the wealthy landowners in Estonia and Livonia were built with ever increasing pomp. Interest in the antique was in fashion then, and local architecture was influenced by Central European art. Along with this the use of decorative plasterwork gained popularity in the numerous manor houses of Estonia. Lots of attention and resources were invested into the building of new constructions and interiors. Many of the involved professionals came from all over Europe to construction works—architects, master plasterers and engineers. The plasterers mainly came from Germany and Bohemia after studying in Prague, Dresden or Berlin.

The most remarkable 18th century Estonian interior with decorative plasterwork was in Põltsamaa castle which was destroyed during the Second World War in 1941. It was in Rococo style and the master decorator was Johann Michael Graff. Notable decorative plasterwork can be found today in Saue, Ääsmäe, Roosna–Alliku, Riisipere, Rägavere, Suure–Kõpu and Maidla manor houses.

The finest examples of late Baroque interiors are in Kadriorg Palace in Tallinn which was completed in the 1720's (figure 1.4). Matthias Seidtinger from Riga and the Italian master Antonio Quadri decorated the main hall which has survived as a whole. Originally there were decorative plasterwork and painted ceilings in the other rooms, as well.

Late 18th century decorative plasterwork can be found in the interiors of the building in Toompea, Tallinn, which is now used to house the Estonian parliament. The architect was Johann Schultz, who designed the rooms in the style of early Neo Classicism.

One of the most distinguished Classicistic manors in Estonia is Riisipere which was completed in 1821, and is unfortunately in poor condition today. The so-called White Hall with its rich plasterwork is the most remarkable room in the manor. The large room is covered by a dome where an illusion of extra height is created as the rows of cassettes diminish towards the top.



Figure 1.5. The Banqueting hall at Skokloster castle in Sweden. Photograph by Holger Ellgaard.

1.3.2 SWEDEN

The inspiration and the craftsmanship for Swedish decorative plasterwork were imported from different countries across Europe. A lot of German and Italian people in the plastering trade have moved to Sweden during the past centuries to distribute their knowledge and skills. Lime was one of the most essential ingredients in the plaster for decorations throughout the 16th and the 17th centuries, but starting from the 18th century the use of gypsum became ever more popular and finally replaced lime altogether.

One of the first examples of decorative plasterwork in Sweden was made during the late 16th century in Uppsala castle. Famous are also the three different plaster

ceilings at Skokloster castle which are dated 1660 and were made by the plasterers Antoni and Zauch (figure 1.5). Many more examples of impressive Baroque and Rococo plasterwork were created in the castles of the wealthy in the prosperous Swedish empire of the 17th and 18th centuries.

The rise of the middle classes together with the neo-styles in architecture and interior decoration in the late 19th century brought decorative plasterwork once again into focus. Public buildings, urban houses and representative flats were decorated with imaginative plasterwork both inside and out. A particularly pompous example of this period is the Opera house in Stockholm.

Like for many other traditional crafts, the interest for decorative plasterwork was out of fashion during a long period in 20th century Sweden. Today the new-found interest for administration of the Swedish cultural heritage has resulted in a renaissance for the art of decorative plasterwork.



Figure 1.6. The throne hall in the Senate Building in Helsinki, 1822 with decorations and furniture designed by Carl Ludvig Engel. Photograph by Kirsti Horn.

1.3.3 FINLAND

The oldest and maybe the most beautiful decorative plasterwork in Finland can be found in the interiors of the buildings around the Senate Square in Helsinki. They were designed and decorated according to plans by Carl Ludvig Engel between 1818 and 1840. Both stucco marble and decorative plasterwork are beautifully represented (figure 1.6). Gypsum plaster was also used for the castings of the more intricate classical details on the exterior of Engel's buildings (capitals, consoles etc.).

During the last decades of the 19th century decorative plasterwork was used in several public and commercial buildings in Helsinki like elsewhere in Europe. The architects of that time were Frans Sjöström, Gustav Nyström and Theodor Höijer, who was particularly fond of decorative plasterwork. The overwhelming façades he created were heavily criticised in the 1960's and consequently, many were pulled down. Yet, many buildings from that period remain, and their maintenance keeps a small number of restorers busy.

The Jugend style gave a new appearance to the interiors and façades of all Finnish architecture at the turn of the 20th century. This time the decorative plasterwork consisted of delicate Nordic floral motifs together with owls, squirrels and other national romantic themes.

In the 1920's and 30's there was a short revival of a sober sort of Classicism with fine and subtle plaster decorations. And never again was this art seen in Finnish buildings except in the ceilings of English-style pubs and on the walls of pizza restaurants!

Part 2: Learning to restore decorative plasterwork at Voltveti Manor

2.1 INTRODUCTION TO THE SITE

Voltveti manor, the scene of the intensive course, is a mighty two storey masonry building from 1830. It has served as a vocational school since 1931 but is now closing down. A big dormitory and a number of neglected outbuildings stand in the park around the mansion telling the history of past activity.

With its grand Classical architecture and the many decorative details and paintings in its halls, Voltveti manor is one of the many listed buildings in Estonia. The exterior of the building is newly restored but some of the interior decorations are in a rather bad shape. Most of the plasterwork in the ballroom and its lobby, where the intensive course took place, has been painted over several times. Where original paintings are visible, they are cracked and peeling off their underlying surface. In addition, there are several more rooms that were decorated originally, and painted over when the school was established on the premises.

During the past few years teachers and students of Estonian Academy of Arts have been involved in unravelling samples of the rich wall paintings of the first floor in Voltveti manor and documenting them through photographs. A historical analysis was made and even a proposal for future restoration principles was presented in their report. However, uncovering and repairing all the paintings and decorative plasterwork in the main hall alone would be a very laborious and costly affair, and has been left aside because of this. This time the focus lay on the study of *stucco* or decorative plasterwork in the main hall.



Figure 2.1. View of the ball room at Voltveti manor. Photograph by Meelike Naris.

2.2 THINGS TO CONSIDER WHEN PLANNING A RESTORATION SITE INDOORS

2.2.1 PROTECTION AND CLEANING OF SURFACES

Wherever a building site or a restoration site is planned, the first things to consider are the means and material for covering all those areas and surfaces that can be stained or damaged by the working process or the created waste. A plan must also be made for sorting and handling the waste.

Much of the dust that is created in building processes is a health risk for those who inhale it. This is why sweeping is forbidden, while vacuum cleaners with good air filters must be used regularly on modern building sites.

2.2.2 SITE SECURITY

Appropriate clothing, personal respirators and other safety gear are regulated and inspected by rigorous authorities in Finland and Sweden while the approach to safety measures seems to be slightly more relaxed in Estonia.

The site security aspects had been well prepared for at Voltveti manor (figure 2.1). Work was done on floor level as well as on scaffoldings some 2 meters up in the air. Because there were no railings on the scaffoldings and the constructions were slightly shaky, students could choose their working place. There was plenty to do on all levels anyway!

Each student was given a white t-shirt that was supposed to be worn all the time on the site. It was taken for granted that all students would have packed working gear and gloves in their travelling bags. The teachers had red t-shirts which made it easy to find them when help and advice was needed. Everyone was also provided with a name tag and safety goggles. Protective clothing was worn when we worked with silicone.

2.2.3 FIRST AID

Even the most experienced craftsman, who is familiar with all the secrets of his trade, can make a mistake and injure himself. For safety's sake there must always be a first aid kit on a building site and clear instructions as to where medical help can be found if it is needed. Several pieces of band-aid was needed for the many small cuts caused by a slipping instrument during the course at Voltveti manor. Everybody was working with a very sharp knife and few were used to such a tool, let alone the sort of work that was meant to be performed. Fortunately, nothing worse than superficial wounds were sustained.

2.2.4 FIRE HAZARD

Working in a historic building is always hazardous in many ways but the worst that can happen is that it catches fire. Initial fire extinguishing equipment must be at hand here as well as on any building site. Extra care is expected from the workers who use tools that can cause sparkles. Indeed, a special licence should be attained for such work if it takes place in the vicinity of inflammable material such as wood, paper, plastics,

textiles etc.

2.2.5 STORAGE

Toxic, inflammable or expensive building material and tools should always be kept behind locked doors.

2.2.6 TIMETABLE

The intensive course lasted only five days. We knew before we arrived that this project would not be finished during our week in Estonia but that this was only the beginning of a very long process. Considering all the working time and the number of people that took part in the course, some 700 hours were spent on cleaning the decorative plasterwork, fixing faults in it, learning to take moulds from some floral ornaments and to cast them. The work tempo would probably increase with experience, but even so it is obvious that estimating time and costs for completing such a project might be impossible.

2.3 COMMON DAMAGES TO DECORATIVE PLASTERWORK

In addition to faulty maintenance techniques, decorative plasterwork can be damaged in four ways: physically, chemically, biologically and mechanically. In most cases the phenomena occur together as one problem leads to the next. Whatever the cause of the damage, repairing it takes time and is consequently very expensive.

2.3.1 TYPICAL PROBLEMS CAUSED BY DAMPNES

CHEMICAL CHANGES IN THE MATERIAL

Corroding metal armatures (e.g. iron) inside plasterwork will oxidize and expand and finally break the object.

If there is gypsum in the plaster, salts will be produced with added moisture because gypsum always remains slightly soluble and absorbent, and the result is a general weakening of the plasterwork.

BIOLOGICAL DAMAGE

Fabrics that are used as reinforcement in plasterwork will deteriorate with dampness, become mouldy or brittle and weaken the structure of the object.

The growth of microorganisms in wet conditions will affect all the organic elements added to plasterwork: Wooden reinforcements, backings and frames can all be severely affected by bacterial or fungal decay.

Staining caused by the ingress of dirt and organic growths will disfigure and break the visual effect of a decorative finish and will reverse the surface modelling.

There can also be decay caused by pests, notably woodworm and death-watch beetle. Acidic action caused by bird and animal feces is also harmful.

MECHANICAL DAMAGE

Because plasterwork consists of many heavy layers of plaster, it will inevitably be affected by gravity. Protruding details are easily knocked off and attachments and brackets often give way.

2.3.2 TYPICAL PROBLEM CAUSED BY CHANGES OF TEMPERATURE

PHYSICAL DAMAGE

If a plaster consists of several materials with differing coefficients of expansion, they will crack the plasterwork in fluctuating temperatures.

2.3.3 OTHER TYPICAL PROBLEMS WITH HISTORIC PLASTERWORK

AESTHETIC DAMAGE

In the course of time decorative plasterwork may have been repainted and repaired with unsuitable materials and techniques which in most cases decrease the artistic and historic value of the decoration.

2.3.4 DAMAGES OF THE DECORATIVE PLASTERWORK IN VOLTVETI MANOR

Most of the damages of the plasterwork were mechanical in the grand hall of Voltveti manor. This is not surprising, as the room has been used as a multi-activity space during the last 70 years. All the decorative plasterwork was covered with several layers of paint. This not only distorts the shape of the designs but also covers all smaller damages, cracks and earlier repairs. Parts of cornices had fallen down in some places and been repaired incorrectly (figure 2.2). Around some broken areas there was also danger of collapse. The seven *putti* with musical instruments had suffered some material loss and damages, and a couple of their heads had been replaced with incorrect pieces made of bad quality plaster (figure 2.3). The acanthus leaves in the corners of the wall panels had lesser mechanical damages (figure 2.4).



Figure 2.2. The removal of paint revealed bad joints between the precast sections. Photograph by Kristiina Ribelus.



Figure 2.3. This putto has lost his instruments. Photograph by Triin Jänes.



Figure 2.4. At a close look all acanthus leaves were slightly different: they had been modelled in situ. Most of them had suffered several blows. Photograph by Kristiina Ribelus.

2.4 REPAIRING DECORATIVE PLASTERWORK AT VOLTVETI MANOR

Working with plasterwork is an exact job. Everything has to be done by hand and every tool must be in good condition for a successful result. During the intensive course the focus was on four things, i.e. the cleaning of the plasterwork from excess layers of paint, repairing damages on the cleaned figures, taking moulds from cleaned mouldings and casting replacements for broken sections.

2.4.1 PAINT REMOVAL

All the decorative plasterwork at Voltveti manor had been covered in many thick layers of paint which had to be painstakingly removed with scalpel before any other work could take place. There were two reasons for this. Firstly, no repair could be done unless the original shapes and surfaces were uncovered. Secondly if one were to create a mould from the heavily painted pieces, detail in the casting would differ from the original and essentially, there would not be any difference between the freshly cast pieces and the badly treated ones.

There are three techniques to remove paint layers from plasterwork: by mechanical paint removal (scraping), using paint removing compresses and various chemical paint removing mediums. These methods can also be combined, of course.

2.4.1.1 MECHANICAL PAINT REMOVAL

The most reliable method of paint removal techniques is the mechanical, and the most important tool is a scalpel (size 10 and 21 were used in Voltveti). This small and very sharp knife is excellent for scraping excess paintwork. A small brush is used for removing dust and flakes of dirt and paint during and after the cleaning process. When removing old paintwork it is important to use goggles because sharp flakes of old paintwork and dust tend to fly about on a site like this. It is also possible to remove a thin coat of paint by abrading the surface with sandpaper with a very fine grit (figures 2.5, 2.6).

Some old layers of paint are likely to contain lead. Therefore it is worth while wearing protective gloves and to avoid inhaling the dust.



Figure 2.5. Working with a scalpel. Photograph by Sandra Heinström.



Figure 2.6. The little fiddler is slowly being recovered from his four coats of paint. Photograph by Amanda Oom.

2.4.1.2 PAINT REMOVING COMPRESSES

To make the removal of paint faster there is a tradition of softening the surface by applying a compress on it, for example a lime compress. The poultice is made by mixing lime paste and baking soda (1:1) and adding a small amount of water (about 25%). The paste is then applied on the surface, covered by a plastic wrap and allowed to work until the coat of paint starts to soften and it is possible to remove the softened layers with a sponge or a scalpel. The required time depends on the type of paintwork and therefore the effect of the compress should be periodically checked on to control the softening of the paintwork. After removing the compress and the paint, the revealed surface must be neutralised by thoroughly cleaning with a sponge and a light vinegar solution (5%). Otherwise the surface may start reacting again with the next (new) paint layer. A problem with using alkali pastes and caustic soda is the possible introduction of salts into the underlying material. Thorough wet cleaning is necessary and alternative paint removing techniques should be considered whenever possible. Yet, compared to more volatile chemical agents lime paste is relatively safe to work with.

When working with lime paste one should always wear safety gloves and goggles.

2.4.1.3 PAINT REMOVING CHEMICALS

The third method for removing paint is to use special chemical paint removing mediums. The medium is applied on the surface according to the manufacturer's instructions and left to work until the paint starts to spume or bubble. The next step is to remove the soft layer of paint mechanically. As before, after using any chemicals, the surface must be thoroughly cleaned with a sponge and water, or else the chemicals may start reacting with the new paint layer and spoil it.

When working with paint removing chemicals, one must wear thick protection gloves and goggles.

2.4.2 REPAIRWORK

2.4.2.1 REPAIRING MINOR DEFECTS

Reparations to old decorative plasterwork are done by applying a mixture of gypsum, water and glue onto the defected parts or in order to build up a missing detail. This is done layer by layer with a soft aquarelle brush. The added material usually needs to be sanded down to fit in with the old shapes (Figures 2.7, 2.8).



Figure 2.7. A putto is getting a face lift. Photograph by Triin Jänes.

2.4.2.2 TAKING MOULDS

Several of the plaster decorations at Voltveti manor were damaged and most of the earlier restoration work was badly executed. Particular eyesores were several stretches of the cornice and the heads of three *putti*. The bad sections were therefore removed and moulds were taken from appropriate clean and repaired places around the room that corresponded with the area that was to be replaced. Two types of moulds were used, namely gypsum moulds and silicone moulds.

Gypsum moulds

Because gypsum is stiff, the mould of a three dimensional object must always be made in sections. When using gypsum for a mould, you start with applying oil on the ornament. Then a modelling paste (plasticine) is placed around the area where the gypsum is to be cast. After that the gypsum is applied on the model.

Silicone moulds

The head of a *putto* [Notes by Anna Lindfors and John Friederich]

“The head of the *putto* we worked on was disproportionate and did not harmonize with the rest of the body. Here it looked like a repairman had taken a head from somewhere else and just attached it with no regards to aesthetical values. It looked just horrible and was removed. A mould was taken from one of the intact *putti* and a new head was cast with a mixture of plaster and glue. The glue acted as a bonding agent and reinforced the plaster.

The method for taking a mould was by first cleaning the existing original thoroughly. This involved removing all paint layers except the one that we presumed was the original one, repairing defects with plaster and applying a release agent on the piece. The release agent is just what the name suggests; a chemical that forms a film on the surface of the original, and it acts both as a protector from the mould material and enables the release of the mould material. We had access to two types of mould material. Both of these consisted of a two-component silicone, one of which cured very rapidly and the other gave a little more working time. These were applied using a sponge and a brush. Many batches had to be made to cover up the head as the mould was created slowly in layers in order not to waste any silicone and to make sure that



Figure 2.8. The white patches are new plaster, not yet sanded down. The bow has not been cleaned yet. Photograph by Amanda Oom.

all the voids on the original were filled. If this step is not done properly, all the errors will be reproduced in the castings from that mould. After the last layer of silicone was in place, a supporting shell of plaster bandages was applied to cover the silicone. It is necessary to give the soft silicone support because the risk is that the cast would be deformed from its own weight as the liquid plaster applies pressure on the mould wall. When the supporting plaster had cured, it was removed. Finally the silicone was peeled off the original and casting could start.”

The process of repairing a *putto* is presented in figures 2.9–16.



32

Figure 2.9. The unproportional head can be seen to the left. Photograph by Sandra Heinström.



Figure 2.10. This *putto* had not only lost his original head but also hurt his wing. Photograph by Sandra Heinström.



33

Figure 2.11. He was decapitated again... Photograph by Sandra Heinström.

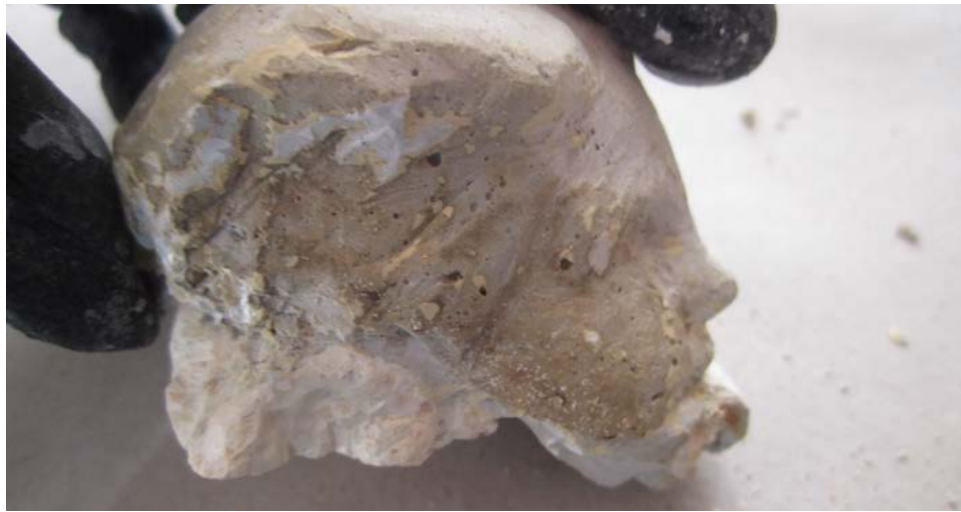


Figure 2.12. A bad cast of bad quality plaster was revealed underneath the paint. Photograph by Sandra Heinström.



Figure 2.14. While a new head was being made the rest of the defects were repaired with gypsum plaster which was then sanded down. Photograph by Sandra Heinström.



Figure 2.13. Luckily there was another flute playing *putto* in the room. Heiti Kulmar is building up the mould layer by layer. The plasticine is there to cover the intact *putto* from droppings. Photograph by Sandra Heinström.



Figure 2.15. The silicone was stiffened with a crust of gypsum before it was taken off the model. Here a new head is in the making. Photograph by Sandra Heinström.



Figure 2.16. The new head in place! Photograph by Sandra Heinström.

Cornices

[Notes by Anna Lindfors and John Friederich, continue]

“In the making of the cornice moulds, the same method as for the *putto* was used. The bad piece was first removed and a section of pristine cornice from elsewhere in the room was selected to act as the original. It was revealed from paint and cleaned by brushing, and small nicks were repaired with plaster and then sanded down in order to get a smooth surface with as many details and few defects as possible. A release agent was applied on it followed by silicone in stages. Once everything had cured properly, a supporting shell of plaster bandages was applied just like in the case with the *putto*

head. A trowel was used to apply the plaster around the silicone.

Through creating moulds by this method, many copies could be made and large sections of damaged plasterwork could easily be repaired. The only limitation is the time plaster takes to cure before it can be extracted from the mould. If there is a need for large quantities of replacement pieces, it is wise to make several moulds to speed up the casting and repair work.

Silicone was used because of its excellent properties in retaining details from the original and its ability to resist plastic deformation. Both of these properties are very sought after in a good mould material because the silicone can fill voids, take shape overhangs and cover three dimensional shapes easily. When removed from the original it can be stretched without tearing and then return to its original form. This is why silicone is widely used in reconstructing stucco.”

A step by step presentation of making a mould is found in figures 2.17–24.



Figure 2.17. Working through many coats of paint. Photograph by Liv Berntsson.



Figure 2.18. The delicate original shapes are not recognizable through the many coats of paint on the right. Photograph by Liv Berntsson.

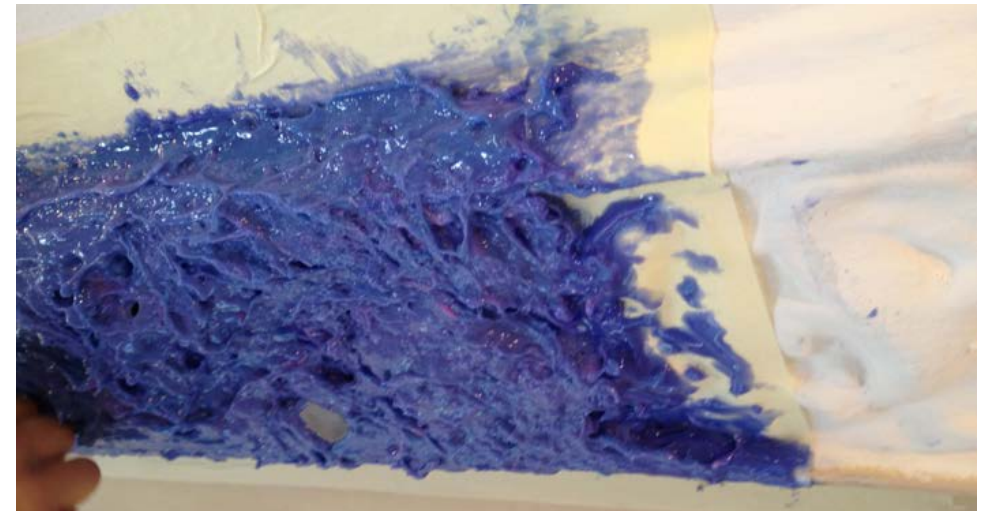


Figure 2.20. The silicone mould was built up layer by layer.



Figure 2.19. The original was touched up with gypsum plaster, sanded and brushed clean to give a perfect mould. Photograph by Liv Berntsson.



Figure 2.21. The silicone was covered with plaster and the whole package was left to dry. Photograph by Kirsti Horn.



Figure 2.22. The moulds were taken down the next day. Photograph by Kirsti Horn.



Figure 2.23. Silicone after the gypsum. Photograph by Kirsti Horn.



Figure 2.24. The silicone mould is ready to be used. Photograph by Kirsti Horn.

2.4.3 RUNNING A MOULD

A lump of plasticine or a profile comb should be used to copy the shape of the moulding that is to be reconstructed. Both were tested when a copy of a moulding in the ballroom was manufactured. The new moulding was run on a table with the help of a mould on a sledge. This can be done directly on a wall or ceiling as well. For making the mould and the sledge, an angle, a compass saw, metal shears, a knife, a pen, an electric drill and circular saw were used.

How to run a mould is presented step by step in figures 2.25–32.



Figure 2.25. The desired moulding was documented by using plasticine and a profile comb. Photograph by Kirsti Horn.



Figure 2.26. The documented moulding profile was transferred on metal sheeting and cut precisely in this shape. A piece of plywood was shaped accordingly and then attached to one side of the metal sheet. Photograph by Kirsti Horn.



Figure 2.27. A sledge was built to hold the stencil upright. Photograph by Kirsti Horn.



Figure 2.28. A wooden rail was attached along one side of the working table. The table and mould were oiled to start with. Photograph by Meelike Naris.



Figure 2.29. Plaster was mixed using a whisk and then poured on the table. The moulding sledge was pushed with metal side first to shape the plaster. Photograph by Meelike Naris.

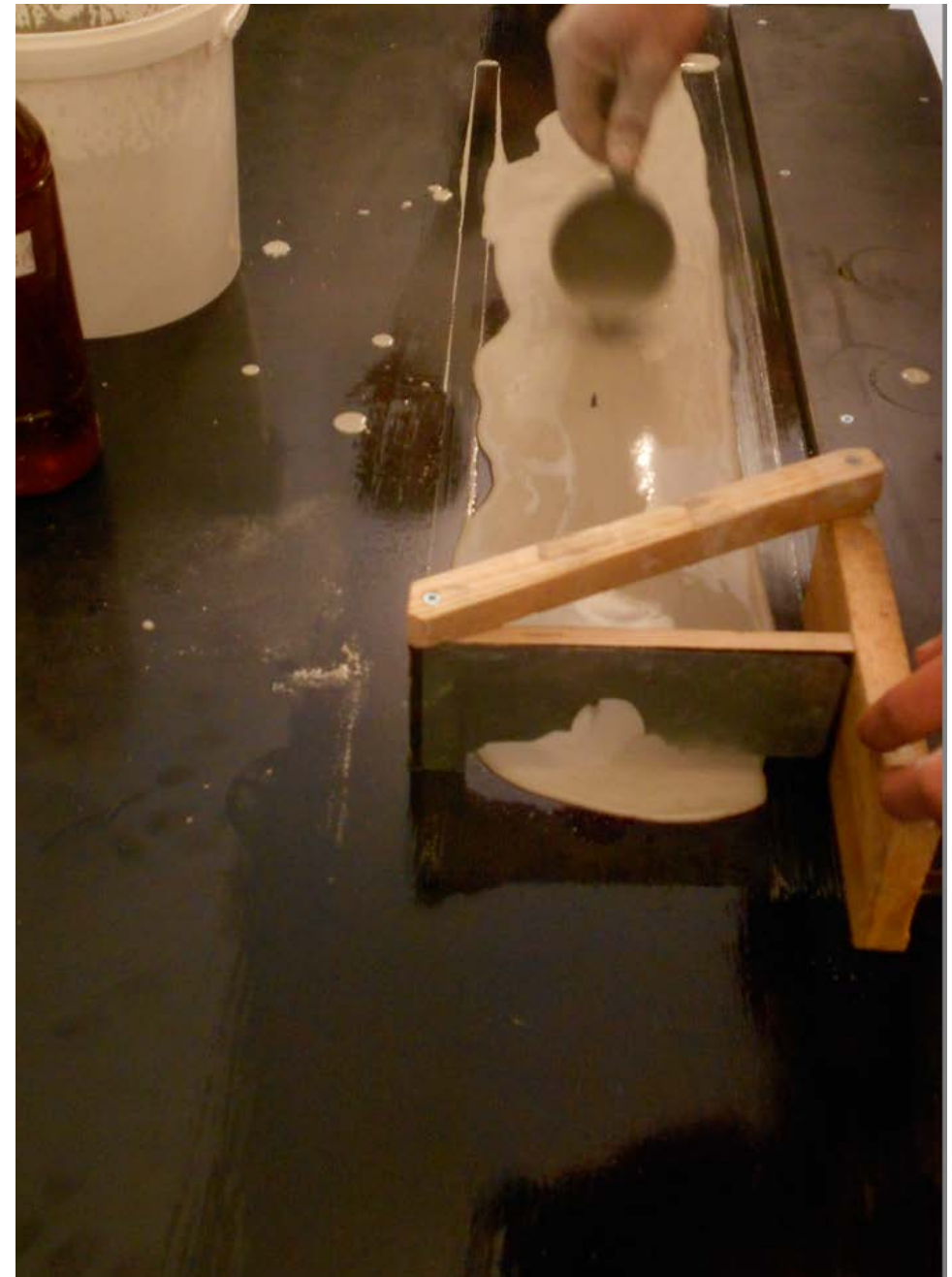


Figure 2.30. More and more plaster was added, repeated pushing, more plaster etc. until the shape was complete.

2.4.4 SURFACE TREATMENT OF DECORATIVE PLASTERWORK

The surface of plasterwork has often been given a finish for three reasons: to make it more attractive, more durable and stain resistant. Because gypsum is a porous material it needs to be treated before it is painted. Historically it was common practice to treat decorative plasterwork with linseed oil or shellac to protect the plaster from moisture. In modern times other oils, silicon and water repellent primers are also used. With the many choices of surface treatment on plasterwork, the material can be given different properties and many variations in appearance.

Traditionally, the primer was followed by tempera, beeswax tempera or linseed oil paint. Often the top layer is of modern alkyd or plastic paint like it was at Voltveti manor. Plaster can also be made to look like other more expensive materials such as metal and stone. After a basic treatment of the plaster, the surface can be gilded with gold leaf and then polished to an even and shiny finish.

Plaster was often used to imitate marble or other kinds of stone. To achieve a marble effect the pattern can either be painted on the surface or created using the antique method called *scagliola* i.e. *stucco marble* or *artificial marble*. This was very popular in Baroque and Rococo interiors. It is made of a mix of plaster, marble dust, pigments and glue. Plasters that have been tinted in various colours are mixed to resemble a marble pattern and then applied in a layer, ca 10mm thick, on a plastered surface. The finish is done through sanding and polishing in several steps with an oil or wax.

Walls can also be plastered with the *marmorino* technique, *stucco lustro* or *Venetian plastering* which are all made of several layers of coloured thin plaster and finished with stains and polishes.



Figure 2.31. Heiti Kulmar is showing the technique. Photograph by Meelike Naris.



Figure 2.32. After the moulding was complete, the piece had to be trimmed still with a rasp, a scalpel and sandpaper grade 80–800. Photograph by Meelike Naris.

2.4.5 FIXING A PLASTER ORNAMENT

[Notes by Lars Eriksson]

“When we were working at Voltveti manor for about a week, we concentrated our work mainly to one large room. There was decorative plasterwork both on the walls and in the ceiling. Each of us was assigned to work with a different detail, and my object of concentration was an acanthus motif in the bottom left corner of a panel on one of the walls. It was covered with three or four layers of paint.

As a tool I was using a scalpel with exchangeable blades, which was useful because they kept breaking, and if they didn't, they got blunt. A brush was also useful for removing dust and paint flakes with (figure 2.33). I got instructions to work myself down to the innermost or most original layer of paint, which was of a greyish–white colour and cracked in a quite beautiful way, so I did this. It took a lot of time, as the details were many, and the person beside me, working on the bottom right corner of the same panel, was competing with me for the work space, as did the scaffoldings, and a person working above me caused a steady snowfall of flakes down on me, which made the work situation somewhat problematic.

It was very difficult to remove layers of paint from the stucco without destroying details in the ornament. When I finished the cleaning job, it was time to reconstruct the missing details (most of them were already missing, before I started with the cleaning). I also discovered old repairs made in different materials. They were mostly fragile so I took most of them away. I discovered small flies that once had got caught in the fresh paint. I cleaned the whole thing free of dust and made a mixture for repairing, which I applied, sometimes in several layers, to build up lost forms. Then I made new forms with my scalpel (figure 2.34), inspired by the many other acanthus motifs in the room, which I studied closely. The last thing I did was to use a fine sandpaper, finally an even finer one, to make a nice finish.”



Figure 2.33. Tools for cleaning. Photograph by Lars Eriksson.



Figure 2.34. It took a whole week to clean and repair one acanthus motif.
Photograph by Kirsti Horn.

3. Conclusions

The project **Traditional Wooden and Masonry Structures in the Baltic Sea Region** is designed for students of building conservation, conservation of artefacts, structural engineering and site management from three universities in Sweden, Estonia and Finland in order to give them the opportunity to learn about the traditional materials in different parts of buildings. From the conservation point of view they learn how constructions and surfaces made of these materials are to be preserved and maintained in the best manner. The hands-on work, which is an integral part of each course, opens eyes also to the possibilities of applying the best of traditional crafts in the modern building industry. The objective is to contribute to the preservation of some historic monument during the days of practical work.

This report, no. 6 in the series, with the focus on decorative plasterwork, describes how these goals were reached during the intensive course at Voltveti manor, Estonia in September 2013.

Firstly, all participants deepened their understanding for architectural detailing through hands-on work, lectures and excursions. Secondly, The performed work contributed to the rescue of the interior of a listed building.

Finally, the articles in this report will certainly spread interest, knowledge and respect for historic monuments and all the various aspects these represent in terms of beauty, handicraft and historical perspective.



Figure 3.1. Group photo with student authors: Kristiina Aas, Anita Jõgiste, Triin Jänes, Aljona Kamenik, Meelike Naris, Grete Nilp, Tiit Nurklik, Grete Ots, Kristiina Ribelus, Maarja Ruut, Hanna Selvet, Sille Sombri, Triin Tammann, Veiko Tamme, Eva Tammekivi, Alexandra Velikoselskaja (*Estonian Academy of Arts*); Sandra Heinström, Mikael Högström, Johan Lindroos, Gustaf Lindroos, Simon Öst, Michelle Wickström (*Novia University of Applied Sciences*); Filippa Bergström, Liv Berntsson, Lars Eriksson, John Friederich, Caroline Laudon, Sarah Lotia, Anna Lindfors, Amanda Oom, Carl Ragnerstam (*Campus Gotland, Uppsala University*). Teachers in front, from left: Kirsti Horn, Krista Laido, Joakim Hansson, Heiti Kulmar, Maria Väinsar, Lilian Hansar. Photograph by Michael Diedrichs.

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Appendices**APPENDIX 1: TERMINOLOGY**

Italian	English	Swedish	Estonian	Finnish
stucchi	stuccoes, stucs	stuckatur	stukkdekoor	kipsikoriste
	decorative plasterwork made of stucco			
stucco	stucco Material for making decorative plasterwork. or or both –	kalkbruk stuckgips	stukk	kalkkilaasti kipsilaasti
	lime stucco, lime plaster Consists of lime + water with or without aggregate.	kalkbruk		kalkkilaasti
	gypsum plaster gypsum +water	stuckgips modellgips		kipsilaasti
il vero stucco antico (definition by Vasari)	true stucco = limeplaster with ground marble or travertine as aggregate		antiikstukk	antiikkilaasti
	Gypsum CaSO ₄ 2H ₂ O	gips(sten)	kips	kipsi(kivi)
	Plaster of Paris = burnt gypsum	gips	kipskrohv	kipsi
intonaco	plain lime plaster for flat surfaces	vanlig kalkputs	lubikrohv	tavallinen kalkkilaasti suorilla alustoilla
	plain lime render ** plaster for flat surfaces			
tectoriaum	lime plaster coating of walls and ceilings + mouldings	slät yta av puts inomhus + listeverk av puts (schablonrappning)	lubikrohv	tasoite / rappaus sisätiloissa + listarappaus (shablonarappaus)
	stucco			
	render	puts för utomhusbruk	krohv	rappauslaasti julkisivuille
	stucco			
	rendering (plaster coating on façades)	yta av puts utomhus	krohv	rappaus julkisivussa
stuccatore	plasterer	stuckatör	stukimeister	kipsimestari

** see Sustainable Heritage report no. 1 *Lime Rendering*

APPENDIX 2: COURSE PROGRAMME

Programme Reconstructing Stucco and Plasterwork—Intensive Course No. 3

Intensive Course No. 3: 'Reconstructing Stucco and Plasterwork' at Voltveti Manor, Estonia, 1.–7.9.2013;
 Traditional Wooden and Masonry Structures in the Baltic Sea Region—Intensive Course within the Field of Building Conservation.

Programme	Swedish students	Finnish students	Estonian students
Day 1 / Sunday, September 1, 2013			
	10:00 Arrival in Tallinn; leaving cars and buses at Suur-Kloostri 11; city tour with Joakim Hansson	11:45 Arrival in Tallinn; leaving cars and buses at Suur-Kloostri 11	Estonian students arrive at Voltveti
	12:30 Departure to Kadriorg Palace with a rented bus; 13:00 'Building history and stucco decorations of Kadriorg Palace', Aleksandra Murre, director of Kadriorg Art Museum		Manor independently by 18:00; accommodation
	14:30 Departure to Voltveti; a quick stop in Pärnu; 18:00 Arrival in Voltveti; accommodation		
	19:00 Welcome Dinner with 'Stucco decorations in Voltveti Manor' by Marie Vinter; 'Introduction to the Project, Site and Schedule' by tutors Maria Väinsar and Heiti Kulmar, Krista Laido		
	Lectures	Hands-on work	After hours, tours, lectures in situ
Day 2 / Monday, September 2, 2013			
	9:00 'What is Stucco? History, materials, techniques', Maria Väinsar	10:00–15:00 Delivering objects for restoration. Observing and documenting their present condition, discussing and choosing feasible methods and materials of restoration. Cleaning and removing later and unvaluable layers of plasterwork and paint.	15:30 Departure to Pärnu 16:15 Pärnu city tour guided by Joakim Hansson 19:00 Buffet dinner at Tervis Medical Spa; tour continues along the seashore villas' region

Day 3 / Tuesday, September 3, 2013			
		9:00–15:30 Cleaning and removing later and unsuitable corrections/repairs. Taking forms from the originals. Making moulds / forms from different materials. Casting from moulds and free hand modelling.	16:00 Departure to Suure-Kõpu Manor 16:30 'Pompeii style wall paintings in Suure-Kõpu manor', Hilikka Hiiop; 'Papier-mâché ornaments in Suure-Kõpu manor', Kadri Kallaste 18:00 Dinner in Suure-Kõpu Manor
Day 4 / Wednesday, September 4, 2013			
	9:00–10:00 'The History of Stucco in Scandinavia and Estonia', Joakim Hansson	10:00–15:00 Taking the forms from the originals. Making moulds / forms from different materials. Casting from moulds and free hand modelling.	15:30 Departure to Viljandi 16:15 Viljandi city tour guided by Joakim Hansson 18:00 'Restoration of Viljandi Traditional Music Centre', architect Raivo Mändmaa 19:00 Dining in Viljandi
Day 5 / Thursday, September 5, 2013			
		9:00–15:00 Completing the details. Fixing details.	15:30 Departure to Loodi manor, the practice site of the speciality of Estonian Native construction, Viljandi Culture Academy, University of Tartu, guided by Joosep Metslang
Day 6 / Friday, September 6, 2013			
		9:00–16:00 Fixing details. Giving finishing touches. Cleaning-up. 16:00 Presentation of hands-on work, discussion	17:00 Farewell Dinner
Day 7 / Saturday, September 7, 2013			
	Departure to Tallinn; foreign students and teachers travel home		

About Estonian Academy of Arts

Estonian Academy of Arts (EAA) is the only public university in Estonia offering higher education in fine arts, design, architecture, media, visual studies, art culture, cultural heritage and conservation.

The Estonian Academy of Arts is a leading national and international center of innovation in visual culture. In addition to active study and research, the EAA also offers lifelong learning opportunities through the Open Academy.

Currently, the 1200 students enrolled at the Estonian Academy of Arts are taught by 83 professors, associate professors, teachers and lecturers. Additionally, 38 workshop managers are on hand to assist students. The Estonian Academy of Arts prides itself on their small student to professor ratio, which allows personal and one-on-one attention for the instructor and learner. Studies take place in small groups of carefully selected students.

Many of the students participate in exchange programmes at partner international universities during their studies. The EAA cooperates with almost 100 universities abroad and belongs to several international higher education networks. Annually, students are recognized in international design competitions.



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About Novia University of Applied Sciences

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About Traditional Wooden and Masonry Structures
in the Baltic Sea Region

The project *Traditional Wooden and Masonry Structures in the Baltic Sea Region* is a partner project in Building Conservation involving Campus Gotland at Uppsala University, Sweden, the Estonian Academy of Arts in Tallinn, Estonia, and Novia University of Applied Sciences in Ekenäs, Finland. This is a follow up of an earlier, very successful project called *Sustainable Heritage* during which both publication series and an online project site were established.


The strategy is a course structure spanning over five years, 2012–2016, to cover a sufficiently wide area of valuable objects of study and thereby forming an entirety. There will be two intensive courses arranged annually with wood and masonry as themes—one every autumn and one every spring.

The intensive courses are tailored for students of *Construction Engineering and Construction Management* at Novia UAS, *Building Conservation and Objects Antiquarian Programmes* at Uppsala University and *Architectural Conservation and Conservation of Artefacts* at Estonian Academy of Arts in Estonia. These courses are hosted by the three partner universities in turns and they are designed to widen the scope of the standard curriculum in each school. The Nordic–Baltic Network is financed by the *Nordic Council of Ministers* through Nordplus funds and its cooperation is run by Novia UAS. The course programme consists of a wide range of themes which concentrate on the two main building materials of our region: stone and wood.

The aim is to learn how these are to be preserved in the best manner and how traditional building and decorating techniques can be applied in modern building.

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This report is about the many stages in restoring historic decorative plasterwork. It is also about what an international group of students learned through their working experience at Voltveti manor, lectures and excursions in southern Estonia.

*The project **Traditional Wooden and Masonry Structures in the Baltic Sea Region** is designed for students of building conservation, conservation of artefacts, structural engineers and site management from three universities in Sweden, Estonia and Finland in order to give them the opportunity to learn about the traditional materials in different parts of buildings.*

From the conservation point of view they learn how constructions and surfaces made of these materials are to be preserved in the best manner.

Please, help yourself to more reports and views of the hands-on activities at various historic sites at www.sustainableheritage.fi.



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