

EUREKA PROJECT E!1495 - EUROCARE ENZYMSEL

1. General description

Project	E! 1495 - EUROCARE ENZYMSEL	Status	Finished - 28-JAN-2000
Title	Development Of Mounting Adhesives And Enzyme Gels For Adhesive Removal From Works Of Graphic Art		
Class	Sub-Umbrella	Technological area	Environment
Start date	01-OCT-1995	End date	01-JUL-1998
Duration	33 months	Total cost	0.08 Meuro
Partner sought	No		
Summary	Standardised Mounting Adhesives On The Basis Of Natural Raw Materials For Works Of Graphic Art Will Be Developed. In Addition, Optimised Composition Of Enzyme Poultices For Removal Of Non-Swellable Mounting Adhesives Will Be Done.		

Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Definition phase	0.01	2
Feasibility phase	0.01	2
Full Exploitation	0.01	6
Implementation phase	0.05	25
Total	0.08	33

Member contribution

Member	Contribution	Position	Since
Austria	76.00%	Notified Finished	28-JAN-2000
Germany	24.00%	Notified Finished	28-JAN-2000

Participants

Company	Country	Type	Role
Graphische Sammlung Albertina/Conservation Department	Austria	Governm./Nat. Admin.	Main
Henkel Austria Gesellschaft Mbh	Austria	Large company	Partner
Staatliche Akademie Der Bildenden Kuenste	Germany	University	Partner

2. Project outline

Project description

There exists a demand for standardised adhesives based on natural raw materials for mounting works of graphic art and other purposes in paper conservation. For acceptance by conservators, adhesives should have a controlled adhesion power and long-term stability evaluated on accelerated ageing experiments in combination with substrates. This is of overall importance since any application of adhesives on valuable objects should be carried out without risks.

These criteria are fulfilled by adhesives based on starch and cellulose derivatives but not by synthetic adhesives such as polyvinyl acetate or polyvinyl alcohol. In comparison with synthetic adhesives, starch paste exhibits excellent properties and, astonishingly, there exist no ready-to-use products on the basis of pure starch paste. It is therefore intended to convert starch-based adhesives into a standardised marketable product.

In detail, the starch paste or modified starch-based adhesives should be lyophilised or sterilised to prepare ready-for-use products fulfilling the requirements on materials to be applied in conservation. In addition, blends consisting of starch and cellulose ethers will be prepared as films for the special demand of low-moisture adhesive materials.

The investigation in this field does not claim as a main purpose a scientific study; rather it intends to offer a product for practical application.

The other part of the project deals with the removal of original mounting adhesives from works of graphic art. Mountings of works of graphic art on paper with non-swellable adhesives based on natural raw materials present great problems for conservators. The hardening of starch or protein-based adhesives is caused by additives such as aluminium sulphate.

The removal of these adhesives is not possible with conventional methods. A good alternative in this case is to decompose the adhesive by enzymatic means. The aim of the research is to apply the enzymes on a locally restricted way with a minimum of moisture to make applications in albums possible.

The project schedule covers several points which have to be worked out overlapping in time.

1. Screening of substances and materials

Selection of starch-based adhesives, modified starches or blends of starch with cellulose ethers as well as the composition of enzymatic gels, including the proposed additives, have to be carried out with respect to safety, availability, long-term stability and compatibility of all components to be applied with the respective substrates.

Regarding the suggested enzyme gels for adhesive removal, one important aspect is the sufficient stability of the gel preparation for storage in the workshop, i.e. sufficient product shelf life.

2. Investigation of residues and long-term consequences

Mounting adhesives and enzymatic gel preparations are both applied locally on objects. Materials under consideration should not cause local changes in the appearance and properties of the treated areas, and there

should not be negative long-term influences on the papers. Investigations in this field will be carried out with the aid of test objects. Test objects are prepared by mounting papers of different qualities and a subsequent accelerated ageing procedure. The long-term behaviour of mounting adhesives will be evaluated on the basis of parameters such as removeability of the adhesive by aqueous means, retention of adhesive power after ageing and probable discolouration effects. Where testing enzyme gel preparations, the aspect of determination of residual components within the substrate and discolouration effects caused by residual components within the substrate, will be investigated. The main goal of the research is to create standard formulations with the minimum enzyme and additive concentrations to fulfil the adhesive removal operation.

3. Implementation under workshop conditions

The results of the investigations on test objects have to be proved on original items in order to find out the optimum composition of mounting adhesive formulation and enzyme gel preparations. Both the application of starch-based adhesives and enzyme gel preparations should be possible in such a way that standardised products could be prepared and handled in a restoration workshop without time-consuming preparation procedures and laboratory equipment. This includes considerations about the commercial production and marketing of these formulations.

Technological development envisaged

This project proposal contains an application-based research in the field of the application of starch-based adhesives and enzyme gel preparations on works of graphic art. The main goal of the research is to develop standardised adhesives and enzyme gel preparations - in both cases ready-to-use products for mounting techniques and removal of original mounting adhesives based on natural raw materials.

Another aim of the project is to help conservators to apply adhesives based on natural raw materials and the preparation and application of enzyme gels for adhesive removal within a restoration workshop having no laboratory equipment.

As additional support, the working out of some practical advice and publications is intended.

Markets application and exploitation

The final goal of the project is the development of definite recipes for mounting adhesives and enzyme gel preparation which can be purchased by conservators and easily applied.

The involvement of the HENKEL Group having considerable expertise in both adhesive development and testing as well as the application of enzymes in washing agents, provides the project with an excellent chance to achieve the planned scientific and practical results, including market the resulting products.

Exploitation of developed mounting adhesives and enzyme gel preparations to remove modified natural raw materials-based adhesives from mounted works of graphic art is scheduled to

take place in the GRAPHISCHE SAMMLUNG ALBERTINA, where hundreds of objects are to be treated.

Project codes

BSI

AUR	treatment
AUY	conservation
BO/BW	chemical analysis and testing
DVU.T	enzymes
THC	adhesives
ZW	arts

NACE

911	Activities of business, employers and professional organisations
9251	Library and archives activities

3. Main participant

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Organisation type Governm./Nat. Admin.
Participant role Main

Contribution to project

Transfer of scientific results to conservation practice. Test of adhesives for mounting techniques and enzyme gel preparations for local adhesive removal. Definition of working standards with regard to large-scale treatments.

Expertise

A specific approach to the problem in the ALBERTINA graphical collection requires close cooperation between conservators and scientists. The extensive experience of the conservators at a renowned institution like the ALBERTINA enables the development of a method providing high levels of security and reliability with regard to the items treated. In the workshop good conditions exist for the implementation and large-scale testing of methods.

4. Partner

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Organisation type Large company
Participant role Partner

Contribution to project

Providing technological information on adhesive materials, enzymes, thickeners and additives. Analytical support for evaluation of long-term stability of adhesives, enzyme residual analysis in paper substrates.

Expertise

Expertise in proposing and choosing adhesive raw materials, modifiers, additive components, enzymes, thickeners, surfactants. Experience in the evaluation and analysis of long-term stability, retention behaviour and determination of residues of the mentioned products in cellulose substrates.

4. Partner

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Organisation type University
Participant role Partner

Contribution to project

Screening of materials under investigation. Artificial ageing test for evaluation of long-term stability of adhesives, preparation of reference materials, evaluation of enzyme activity in relation to moisture, concentration, additives.

Expertise

The Paper Restoration Training Programme offers the opportunity to carry out research based on practical experience in cooperation with conservators within end-of-term studies and theses. A major task is the preparation of standard test materials to carry out simulated methods of treatment. Other major tasks are the testing of newly developed products by means of artificial ageing techniques, the development of suitable working methods and the transfer of results from scientific research to practical approaches and needs of conservation work