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**NEW MATERIALS AND METHODS USED IN THE  
CONSERVATION OF THE XVIII<sup>TH</sup> CENTURY  
CURVILINEAR CANVAS PAINTING  
'ADORATION OF THE MAGI' FROM THE  
SAINT-AUBAIN CATHEDRAL CHURCH IN NAMUR**

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**Abstract**

Paper discusses a concept and conservation methodology of the XVIII<sup>th</sup> century curvilinear canvas painting 'Adoration of the Magi' from the Saint-Aubain Cathedral church in Namur (Belgium). Atypical form of the painting bowed in the horizontal plane, adapted to the apse wall and its very large size (3.70 x 4.50 m) required using some innovative technologies and materials. The basic premise of the conservation process was a detailed analysis of the canvas shape and its preservation on each step of the conservation works. The concept required construction of two curved platforms: concave and convex. The new system of the canvas overturning was also designed. An innovative method of strengthening of the canvas during lining process in vertical direction by using Kevlar fibres was applied. Required strengthening and modification of the stretching frame is also discussed.

*Keywords:* curvilinear, large-size, lining, stretching, Kevlar fibres

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**1. Introduction**

The principle of the individual approach to the each piece of art has a particular importance when we face a conservation of an atypical object. In this case, despite new conservation proposals new technical solutions and materials must often be adapted. Such an example is the conservation of curvilinear canvas painting 'Adoration of the Magi' from the Saint-Aubain Cathedral church in Namur. The painting belongs to the group of four large-size canvases,

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presenting the scenes of the Christ's childhood, exposed in the cathedral's presbytery.

The author of this opus is Mauritius Heinrich Loder, who was born in 1728 in Germany and died in 1793 in the province of Namur. The painting presents the moment of the arrival of the Three Wise Men who deposit their gifts at the feet of Infant Jesus accompanied by Mary and Joseph. The scene takes place in a dark shed, where the royal procession enters. The Kings are surrounded by pages, dignitaries and servants leading the camels. The oldest of the kings kneeling offers to Jesus a gold casket. Procession is accompanied by the founder of the paintings (Figure 1a): Monseigneur Berlot, Bishop of Namur from 1741 to 1771. The coat of arms shown below his feet confirms the dignitary identity (Figure 1b). In the crowd of arrivals, Loder also placed his self-portrait. The composition of the scene refers to the Ruben's altar painting from the Cathedral church in Antwerp.



**Figure 1.** (a) Portrait of Paul Godefroid de Berlo Bishop of Namur and (b) the coat of his arms.

The cycle of the paintings from the Saint-Aubain cathedral was planned as a decorative element closely connected with the architecture, thus two of them obtained an unusual form adapted to the shape of the apse walls. The canvas 'Adoration of the Magi' is bowed in the horizontal plane. The painting is 3.70 m high and 4.50 m wide. The weight of the painting, including the frame is about 300 kg.

Inspection revealed a special construction of the stretcher frame. The upper and lower stretcher beams were bowed by making perpendicular cuts on the outer side of both beams to a depth of approximately 3-5 cm. The beams were stiffened with suitably shaped flat iron bars. The sagitta of the stretcher frame is 37 cm.

The painting was in a very poor condition and required complex conservation works. The main conservation problem was a serious deformation of the canvas support resulting from the incorrect stretching. Upper part of the

painting was subjected to rheological processes due to the gravity. A creep of the fabric resulted in its elongation and the material excess in the painting bottom part hung down. The canvas was badly distorted and fragile, while the painting layer showed numerous damages and cracks. The original composition of the painting was almost invisible.

## **2. Materials and methods - conservation project logistics**

The main concept behind the conservation was to preserve the curvilinear canvas form on each step of the conservation works. Impregnation and lining of the curvilinear painting on a flat surface would cause additional stresses while later stretching it on the curved stretcher frame. Only the consistent preservation of the painting curvature during conservation process could ensure the stabilization of its unusual shape. For this reason, the mathematical calculation of the object curvature was necessary.

The painting shape was measured by means of laser scanning in the initial phase of work. Over 4500000 points with angular resolution of 0.0157rad and accuracy of 0.3 mm in the radial direction were acquired by a laser scanner 3D Surphaser 25HSX. Results of the scanning allowed finding profiles of canvas surface and assessing dimensions and curvature of the stretcher frame. It appeared that the painting shape was neither cylindrical nor ellipsoidal, but a kind of a ruled surface which could be described by a polynomial function. The measurements were necessary for the design and manufacturing of curvilinear work tables used for further conservation works [1].

Two separate wooden tables, concave and convex, were built and placed in one of the lateral chapels adapted for the conservation works. The surfaces of the tables were covered with a polyester mat, temperature resistant up to 100°C, and later protected with a silicon film. The restoration process required access to the face and back side of the painting, so during the conservation treatment the canvas had to be overturned several times. Usually for the over-sized canvas paintings a roller can be used [2], but the canvas support of the Loder's painting was too fragile to be rolled.

Canvas support of the painting was highly degraded. The individual linen fibres became weak and split as result of oxidation processes. The canvas pH was acid, in some places below the pH4. What's more, the concave painting cannot be rolled with the painting layer facing outside. Rolling would result in extending of the outer layer (flakes of the paint layer and grouting) and compression of the inner one (linen). Application of even a large diameter roller could risk tearing of the canvas and losing parts of the original painting layer.

That is why another system of canvas rotation had to be developed. An innovative idea was to overturn the painting suspended on a metal bar. In order to provide sufficient stiffness of the bar (length of 4 m) it was constructed from steel, telescope-like tubes.

The bar was positioned above both work tables by ropes fixed to the roof structure. The ropes were introduced through the chapel vault through the existing holes in the ancient decorative elements. The canvas fixed by the shorter side to the metal bar was raised up from the one table and slowly placed on the other one each time it was necessary to change the accessible side of the painting. The rotation system was furthermore equipped with a hook weight, so the weight of the painting was checked on each step of the conservation works.

The weight of the canvas itself before the conservation was 26 kg. The weight of the stretcher was 79 kg and of the frameless than 200 kg. The painting will also be weighed after the conservation. It is estimated that the weight of the object, together with the frame will increase of more than 100 kg.

### **3. Results**

#### ***3.1. Technical works - cleaning of the support, straightening and consolidation, removing of the dust and brown varnish, filing of the priming and paint losses***

In July 2013, the painting situated on the high of 5.5 m above the church floor was taken down off the wall. The painting was fixed to the wall with hooks and additionally supported at its bottom with wrought brackets. The painting frame was strengthened using wooden battens and a steel tape prior to taking the painting off the wall. During the operation the frame was tightened with belts and secured with a rope fixed to a roof structure. The painting was lowered down with aid of two ropes and pulley wheels fixed to the scaffolding (Figure 2a).

Next, the frame was taken out (Figure 2b) and the painting surface was protected by facing. The reverse of the painting was preliminary cleaned using brushes and a vacuum cleaner. The thickness of the layer of accumulated dirt was more than 3 cm. The canvas was originally fixed from the side of its face to the stretcher's frame. Therefore, it was decided to place it on the concave work table. Old nails fixing the canvas were taken out and the stretcher's frame was removed. In the next step, the painting was suspended from one side to a metal bar, raised and placed on reverse side on the convex table (Figure 2c).

The support was cleaned through the chess-board method (Figure 2c) using water steam. Humidification of small areas only, eliminated contraction of the entire canvas surface. Moisture excess was drained out by rolling of lignin rollers. The substrate was dried out using ironed linen. This operation almost entirely eliminated the biggest deformations of the linen fabric. Then water solution of a biocidal drug was applied at the painting back-side.

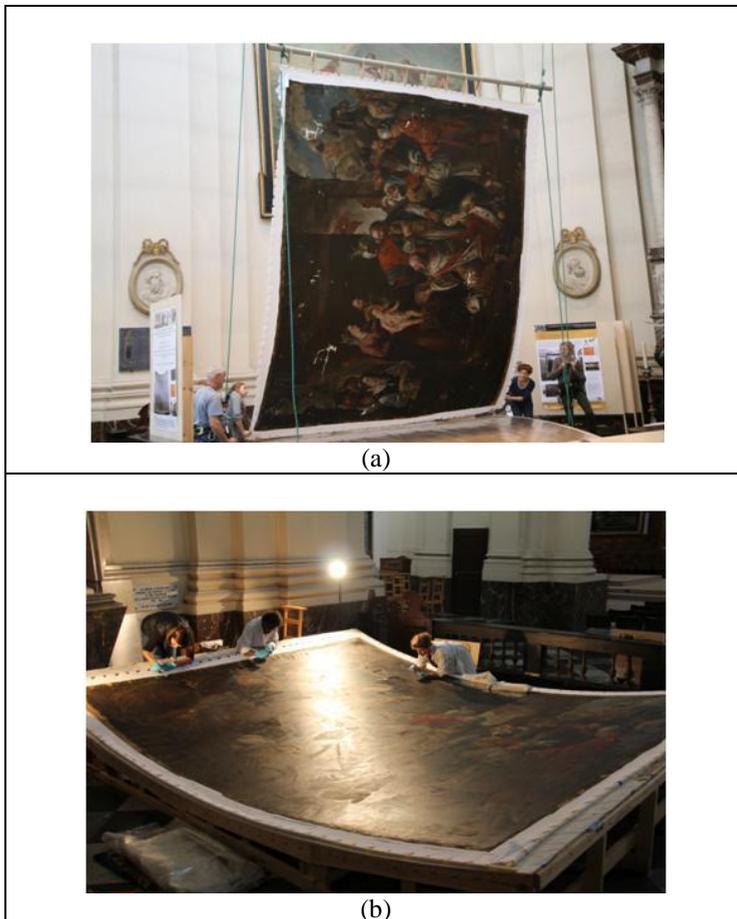
The next step of the work, were laborious local repairs of the canvas support and consolidation of the painting layers. Patches, made from old canvas of similar density, were glued by edges and reinforced from the backside by nonwoven fabric. The painting was impregnated.



**Figure 2.** (a) Setting the painting down by using pulley hoists and ropes, (b) taking off the frame, (c) painting placed face down on the convex platform during cleaning operation through the chess-board method.

In order to remove layers of the dust and brown varnish from the canvas' face the painting was turned over onto the other platform (Figure 3).

After cleaning the original colours, some details and finally the signature of the artist were discovered. The signature: LODER, written with black paint in capital letters, was found in the lower left corner of the canvas, painted on a basket with a rim facing a viewer. In following steps, losses in paint and priming were filled with elastic ground.

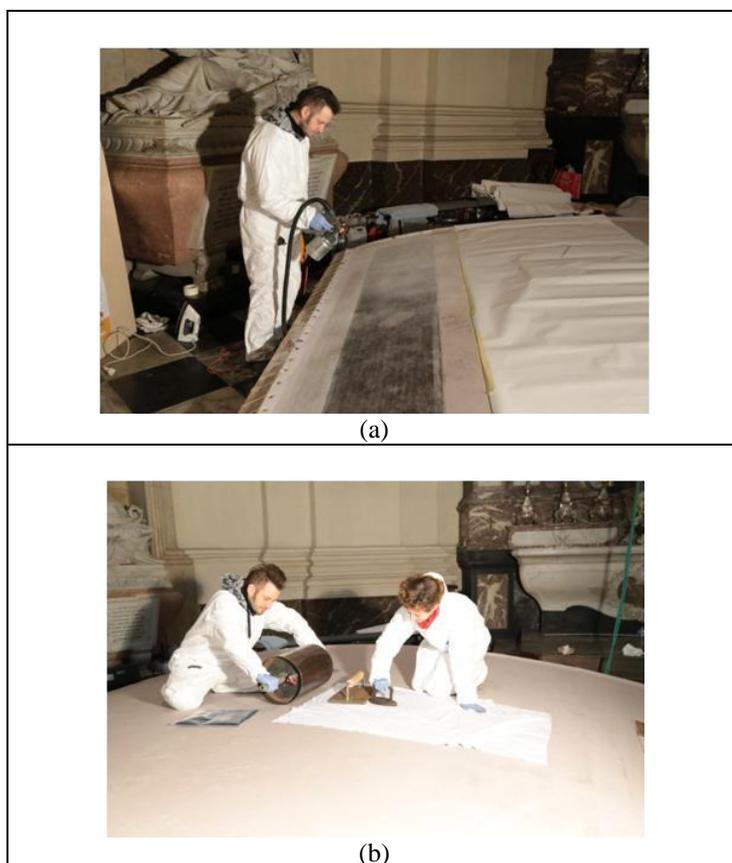


**Figure 3.** (a) System for canvas overturning, (b) painting placed face up on the concave platform during cleaning operation.

### **3.2. Lining operation – string stretching**

The painting was placed face down and stretched on the convex platform by using cords attached to plastic rods positioned in auxiliary sleeves. Such system provided very good tensioning of the whole surface of the painting and allowed for straightening of local deformations of the canvas.

During lining process an innovative method of canvas strengthening in the vertical direction was applied. Before lining operation the experimental investigation of stretching induced deformation of such a curvilinear canvas was done with aid of a simple string model [3]. The conclusion was that stretching forces should coincide with canvas straight-line segments, which coincide with surface rulings [Wolfram MathWorld, <http://mathworld.wolfram.com/RuledSurface.html>, accessed March 04, 2014].



**Figure 4.** (a) Spreading of Beva 371 on the painting support already straightened with Kevlar fibres, (b) lining of the painting on the polyester canvas by using metal roller heated with warm water.

The canvas support was straightened by using Kevlar fibres stretched in the vertical direction. The fibres were sewed parallel in the nonwoven stripes, which were later fixed between the original support and the lining canvas. The painting was relined on a new polyester canvas using diffused solution of the synthetic resin Beva 371 (Figure 4a) [4]. For lining, we used not only traditional irons but also metal rollers of our own design, heated with warm water (Figure 4b).

After the lining, the surface was cooled by metal plates and cold gel compress. The final stage of the work was retouching. The areas of losses of the painting layer were integrated with local colour and missing elements of the composition were reconstructed. Finally, the painting surface was covered with dammar varnish.

### **3.3. Stretching system**

Research shows that the Loder's painting requires a new stretcher construction. Our current studies aim at preserving the original stretcher frame and modifying them to obtain a proper vertical tension.

In original stretcher's design, the elastic properties of wood were employed. Two vertical braces connected at their mid-span by three battens were supposed to bend backward during stretching until they touch the wall.

It was decided that the old stretcher would be strengthened with vertical bars and old stretching method would be additionally enhanced with a possibility of local tension corrections at painting's boundary. Painting frame would bear all the weight as previously. The old suspension system would be changed to a new movable pantograph like suspension, which allows a suitable access to the painting from the backside.

## **4. Conclusions**

Conservation project of the non-planar canvas painting 'Adoration of the Magi' from the Saint-Aubain Cathedral church in Namur allowed developing conservation methodology for the whole group of curvilinear canvas paintings.

The most important advantages of the presented procedure are:

- preservation of the original canvas curvature on each step of the conservation works;
- elimination of the painting rolling (another system of the canvas overturning was proposed);
- reinforcement and stretching first of all the vertical canvas direction;
- preservation of the original stretcher frame as an example of historical construction;
- modification of the stretcher system out of the original stretcher frame.

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