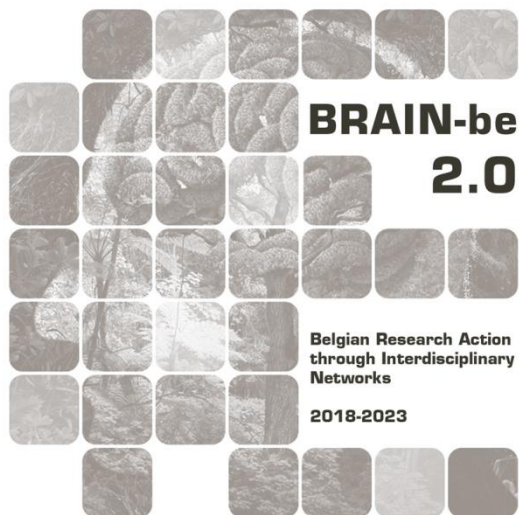


## **[PROMATECH]**

### **[Production, Materials and Techniques of Copper Alloy Alms Basins in Northern Europe (15th - 17th centuries)]**

Sophie Balace (Musées Royaux d'Art et d'Histoire) – Anne-Clothilde Dumargne (Musées  
Royaux d'Art et d'Histoire / ULiège) – David Strivay (CEA, ULiège)

Pillar 2: Heritage science



NETWORK PROJECT

## **[PROMATECH]**

**[Production, Materials and Techniques of Copper Alloy Alms Basins  
in Northern Europe (15th - 17th centuries)]**

Contract - B2/202/P2/PROMATECH

**FINAL REPORT**

**PROMOTORS:** Sophie BALACE (MRAH-KMKG)

David STRIVAY (CEA, ULiège)

**AUTHORS:** Anne-Clothilde DUMARGNE (MRAH-KMKG)

Sophie BALACE (MRAH-KMKG)

David STRIVAY (CEA, ULiège)





Published in 2024 by the Belgian Science Policy Office  
WTCIII  
Simon Bolivarlaan 30 bus 7  
Boulevard Simon Bolivar 30 bte 7  
B-1000 Brussels  
Belgium  
Tel: +32 (0)2 238 34 11  
<http://www.belspo.be>  
<http://www.belspo.be/brain-be>

Contact person: Helena Calvo Del Castillo  
Tel: +32 (0)2 238 36 15

Neither the Belgian Science Policy Office nor any person acting on behalf of the Belgian Science Policy Office is responsible for the use which might be made of the following information. The authors are responsible for the content.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without indicating the reference:

S. Balace, A.-C. Dumargne, D. Strivay. *Production, Materials and Techniques of Copper Alloy Alms Basins in Northern Europe (15th - 17th centuries)*. Final Report. Brussels: Belgian Science Policy Office 2024 – 28 p. (BRAIN-be 2.0 - (Belgian Research Action through Interdisciplinary Networks))

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>ABSTRACT</b>   | <b>5</b>  |
| CONTEXT .....   | 5         |
| OBJECTIVES .....  | 5         |
| CONCLUSIONS.....  | 5         |
| KEYWORDS.....   | 6         |
| <b>1. INTRODUCTION</b>  | <b>6</b>  |
| <b>2. STATE OF THE ART AND OBJECTIVES</b>   | <b>7</b>  |
| <b>3. METHODOLOGY</b>   | <b>8</b>  |
| 3.1. MATERIAL AND TECHNICAL DATA .....  | 8         |
| 3.1.1. Nomenclature and protocol for the description of the basins  | 10        |
| 3.1.2. Formal procedures to acquire and to analyze material data  | 11        |
| 3.1.3. Explore other techniques to acquire and record material data   | 12        |
| 3.2. HISTORICAL DATA.....   | 14        |
| <b>4. SCIENTIFIC RESULTS AND RECOMMENDATIONS</b>  | <b>15</b> |
| 4.1. TECHNICAL GESTURES AND SKILLS OF THE COPPER-BASED METALLURGY ARTISANS IN THE LATE MEDIEVAL AND EARLY MODERN PERIOD ..... | 16        |
| 4.2. CHARACTERIZE THE MATERIALS: ALLOY DIVERSITY, TECHNICAL CONSTRAINTS AND "RANGES" OF ITEMS.....                            | 17        |
| 4.3. THE ORGANIZATION OF THE METALLURGICAL CRAFT. WORK AND MARKET OF COPPER-BASED PRODUCTS: AN OVERVIEW .....                 | 18        |
| <b>5. DISSEMINATION AND VALORISATION</b>  | <b>19</b> |
| 5.1. COLLABORATIONS AND NETWORKS .....  | 19        |
| 5.2. COURSES, WORKSHOPS AND SEMINARS .....  | 20        |
| 5.3. AWARDS .....   | 21        |
| 5.4. COLLECTION MANAGEMENT .....  | 22        |
| <b>6. PUBLICATIONS</b>  | <b>23</b> |
| <b>7. ACKNOWLEDGEMENTS</b>  | <b>25</b> |
| <b>ANNEXES</b>  | <b>27</b> |

## **ABSTRACT**

### **Context**

The PROMATECH project was based on the interdisciplinary collaboration between the European Decorative Arts Department of the Royal Art & History Museum of Brussels (MRAH-KMKG) and the European Center of Archaeometry of the University of Liège (CEA, ULiège). It planned to make a substantial contribution to the field of material culture studies, a still emerging research domain in Belgium, and aimed at shedding new insights on one of the most emblematic objects belonging to the exceptional Belgian “dinanderie” history and production for which it has enjoyed a long-lasting international recognition. The project focused on the study of so-called "offering basins", versatile and utilitarian items that were mass-produced between around 1450-1550. It aimed at studying these objects from a technical and material point of view, to highlight the practices and skills of craftsmen working with copper and its alloys in Northern Europe, but also to look at the diffusion and use of these objects in society and to understand the specificities of the commercial market.

### **Objectives**

This type of “alms” basins is still massively present in museums and churches all over the world. However, our knowledge of their technical processes, the nature of the materials used, the skills of the craftsmen, and their marketing and distribution strategies were still poorly understood. As a result, in the collective imagination, they remained obsolete heritage utensils that were difficult to link to a specific context.

To restore this context, the PROMATECH project carried out an interdisciplinary research, based on visual, textual, material, and experimental data, to highlight the material elements (the techniques and the alloys’ compositions), as well as the historical elements (social, cultural, and economic) that documented the production, use and perception of these objects in the medieval and pre-modern period. By shedding new light on one of the most emblematic objects of the prolific “dinanderie” production, the project planned to make a substantial contribution to the field of material culture studies, medieval and post-medieval craft and metallurgy organization, and renew the study of utilitarian objects. It pursued three main objectives: **1.** characterize and understand the technical gestures and skills of the copper-based metallurgy artisans in the early modern period; **2.** characterize the materials in terms of alloy diversity, technical constraints and "ranges" of items and **3.** recontextualize the organization of the metallurgical craft to highlight the trade strategies of the workshops.

### **Conclusions**

The project gathered a definitive corpus of 833 objects, enabling the study of 16 European collections, among the most important in the world. The vast majority of these collections had never been studied before.

Research into written, iconographic and archaeological sources contributed to the compilation of several sub-corpus: 120 documents, 329 images and a dozen archaeological finds. The material study of the objects identified more than a thousand different types of ornament, corresponding to the use of a very large number of engraved dies, guaranteeing a very wide range of ornamental variability in a highly standardized craft organization.

Secondly, serial observation of the objects enabled to identify most of the techniques used by the craftsmen, some of the tools employed and to reconstruct the main stages of the production processes.

In-depth study of the corpus allowed to collect over a thousand analyses of alloy composition using portable X-ray fluorescence. To date, this is the largest archaeometrical database available for these objects. Finally, the interpretation of the historical data suggests that these objects played a prominent role in late medieval and early modern society, due to their ubiquity and wide range of uses, both domestic and religious.

### **Keywords**

Brass – Basins – Middle Ages – Nuremberg – Material Culture – Metalwork – Workshops

**Project website:** <https://www.kmkg-mrah.be/fr/scientific-research/promatech>

**Project workgroup:** <https://promatech.slack.com>

**Social media linked to the project:** <https://twitter.com/acdumargne>

**Project online database:** [https://heurist.huma-num.fr/heurist/?db=ACD\\_Basins](https://heurist.huma-num.fr/heurist/?db=ACD_Basins)

## **1. INTRODUCTION**

This project was based on the collaboration of the Center of Expertise for Decorative Arts of the Royal Museum of Art and History in Brussels (MRAH-KMKG) and the Center of Archaeometry of the University of Liège, driven by the ambition and common desire to rehabilitate objects that remain in the blind spots of historical research. This project intended to draw attention on “alms” basins – i.e. neglected objects – suffering for not being considered as research topic per se. It assumed that a better understanding of these objects would have led to better preservation practices, as it aimed both to gather the documentation and the references that can be reused by conservation and scientific stakeholders and academics to provide an exhaustive methodology to study and recontextualize the collections preserved. The valorization of these collections also contributed to remedy the lack of interest in these objects from the public – familiar but often devalued – by linking them to the rich Belgian historical context of production.

In many ways, this project served both as a methodological and epistemological example to identify the challenges, the issues and the renewed perspectives of material culture studies.

## 2. STATE OF THE ART AND OBJECTIVES

Copper alloy basins have been found since the Merovingian period, at first exclusively as votive objects in elites' burials (Trotzig 1991). A few centuries later, they gradually integrated the domestic space as utensils dedicated to body care, especially washing and bathing. From the 15<sup>th</sup> century on, they also acquired a liturgical function: they were used for the handwashing ritual and the collecting of alms during the mass. Originally very simple in design, the forms of the basins started to diversify in the 15<sup>th</sup> century, reflecting a growing demand and the diffusion of the object into society. From this period on, a specific part of the production – consisting of more or less concave circular plates of variable diameters (from 10 to 80 centimeters) –, introduced by the northern European workshops, was decorated with a large variety of iconographic themes, representing biblical scenes and/or vegetal, geometric and epigraphic patterns. This production was very successful until the end of the 16<sup>th</sup> century, when it became obsolete.

To date, these basins were very little studied. Apart from some dated art historical studies focused on their aesthetic features (iconography and inscriptions), these objects have attracted scant attention from the academic community. The earliest studies dated back to the nineteenth century and recent publications were thin on the ground. Those publications focused either on the description of iconographic themes, ornaments and stylistic features (Danneil 1841; Stegmann 1899), or on the attribution to a specific production area (Wiswe 1985; Gadd 2008). A third category of publications includes studies that describe and catalog items in specific public or private collections (Birch 1929; Zastrow 1981; Egyeki-Szabó 2008; Chotzakoglou 2012; Tiedemann 2015). This narrow angle can be explained by the discrete presence of these objects in historical sources, being anonymous and mass-produced. This methodological issue could only be overcome, including a more dynamic reflection concerning the conditions and production processes of these objects, the characterization of the technical gestures and the materials used, as well as the identification of knowledge and skills of the artisans. It was the approach that was chosen for this project.

### Bibliography

Birch J.G (1929), « Early Nuremberg Brass Dishes », *The Connoisseur. A Magazine for Collectors*, 334, p. 67-72.

- Chotzakoglou C.G (éd.) (2012), *Zypern – Deutschland: 800 Jahre Geschichte und Kultur*, Leukōsia : Hetaireia Kypriakōn Spoudōn.

- Danneil J.F. (1841), « Über die räthselhaften Inschriften in alten messingenen Taufbecken », *Jahresbericht des Altmärkischen Vereins für Geschichte und Industrie*, 4, p. 55.

- Egyeki-Szabo T. (2008), *Beckenschlägerschüsseln (15.-16. Jahrhundert)*, Budapest: Mester Nyomda.

- Gadd J. (2008), « Brass Basins and Bowls from a Single Nuremberg Workshop, around 1500-1580 », *The Journal of the Antique Metalware Society*, 16, p. 2-21.

- Stegmann H. (1899), «Sur Geschichte der Herstellung und Verzierung der geschlagenen Messingbecken », *Mitteilungen aus dem Germanischen Nationalmuseum*, p. 11-28.
  
- Thomas N. et Saussus L. (2015), « Rapport des expérimentations archéologiques », *Archeolo-J*, Barys, p. 23-71.
  
- Thomas N., Bourgarit D., Verbeek M. et Asmus B. (2013), « Commerce et techniques métallurgiques: les laitons mosans dans le marché européen au Moyen Âge (XIII<sup>e</sup> - XVI<sup>e</sup> siècles) », *Actes du colloque international L'archéologie au laboratoire*, organisé par l'Inrap, la Fondation EDF et Universcience, Cité des Sciences et de l'Industrie, Paris, 27-28 janvier 2012, p. 169-182.
  
- Tiedemann K. (2015), *Nürnberger Beckenschlägerschüsseln*, Dettelbach: J.H.Röll.
  
- Trotzig G. (1991), *Craftsmanship and Function. A study of metal vessels found in Viking Age tombs on the island of Gotland, Sweden*, Stockholm: Statens Historiska Museum.
  
- Wiswe M. (1985), « Anmerkungen zur Frage nach den Herstellungsorten von Messingbecken », Meckesep C., *Stadt im Wandel. Kunst und Kultur des Bürgertums in Norddeutschland 1150-1650, Ausstellungskatalog, Braunschweigisches Landesmuseum (Vieweghaus), Stuttgart, vol. 3, p. 323- 326.*
  
- Zastrow O. (1981), « La collezione di bacili d'ottone del XV e XVI secolo nelle Civiche Raccolte d'Arte Applicata del Castello Sforzesco », *Rassegna di Studi e di notizie*, 9, Anno VIII, p. 473-485.

### 3. METHODOLOGY

The methodological approach, in particular the cross-fertilization of historical sources, the material and technical-based approach and the scientific analyzes, helped to provide comparative data to contextualize the techniques, knowledge, and trade of these mass-produced copper alloy utensils. Material and analytical data contributed to highlight, on a larger scale, trends or changes in manufacturing processes, supply strategies and professional skills. The expected impact of the project was to encourage new research on copper alloys objects, to create a network of skills and reusable data. Based on the sixteen collaborations concluded with European Decorative Art museums, the project federated an academic and professional network (curators, academics, conservators, restorers, collectors, etc.), contributing to the recognition of these objects – mostly preserved in museum's storages, out of the public sight – as heritage assets of interest.

#### 3.1. Material and Technical Data

One of the most important parts of the project was the selection of a corpus to be studied and interpreted. The project gathered a definitive corpus of 833 objects, enabling the study of 16 European collections, among the most important in the world. The vast majority of these collections had never been studied before and was mostly preserved in the institutions' storerooms (**Table1**). The selection



was elaborated to meet representative purposes. From a statistical perspective, the corpus had to be large enough for the data analysis, obtained from the description protocol, to be reliable. From a technical and material perspective, the number of objects allowed to study more precisely the specific production processes – mass production – by selecting several same types of basins to compare their shapes, measurements, and material traces, revealing gestures and tools. Finally, from an iconographic perspective, the selection of the corpus was also based on the desire to consider the multiplicity of themes and/or ornaments represented on these objects. Without being exhaustive, the selection was corollary attached to evaluate the number of dies used by the craftsmen for the realization of the decorations. Some small collections have therefore only been studied in order to integrate specific typologies featuring rare or simply missing iconography.

The project focused first on the study of the collection of KMKG-MRAH, which included 63 copper-alloy alms basins. The collection served as a reference to elaborate the descriptive protocol and obtain the first analyzes on the composition of alloys. Then the corpus was extended to other collections to test the reliability and the adequacy of the descriptive methodology and to enrich the repository of analytical data.

The epidemic situation, which was still worrying at the end of 2021 and the beginning of 2022 for some countries (notably the United Kingdom and the Netherlands), caused delays in the organization of research trips, particularly in Amsterdam (Rijksmuseum) and Glasgow (Burrell Collection), whose museums were particularly affected by the reactivation of strict health measures (closure of institutions and reception of researchers postponed to a later date), forcing the team to give priority to local destinations in Belgium, but less significant in terms of number of objects to be studied. The favourable evolution of the pandemic, however, made it possible to quickly renew contacts with the collection managers and to set up a new provisional work schedule. The project nevertheless suffered from certain delays, caused by the gradual resumption of the teams' activities in these museums, notably Amsterdam, whose collection had to be abandoned due to lack of response from the teams, and London, whose collection could only be accessible at the very end of the project, at the beginning of June 2024. This delay had an impact on the general processing and interpretation of the project data.

Two kinds of data were collected from the collections:

- data concerning the study of the objects (observations, descriptions, measurements and photographs) that were compiled in a database, which served as a referential descriptive protocol for the study of the alms basins.
- analyzes on the composition of alloys by p-XRF, that were added, for each basin, in the mentioned database.

In parallel with the study of this specific corpus, a global inventory of basins preserved in museums collections and churches worldwide has been undertaken to locate, list and map these items and provide comparisons to the corpus. To date, this inventory lists 4,293 objects and 2,022 identified conservation sites in 26 different countries (**Table 2**).

|  | Lieu de conservation                               | Nombre     |
|--|--|------------|
|  | Barcelone, Museu del Disseny                       | 184        |
|  | Bruges, Gruuthusemuseum                            | 9          |
|  | Bruges, Onze-Lieve-Vrouw ter Potterie              | 5          |
|  | Bruxelles, Musées Royaux d'Art et d'Histoire       | 63         |
|  | Cologne, Schnütgen Museum                          | 18         |
|  | Glasgow, Burrell Collection                        | 75         |
|  | Glasgow, Kelvingrove Art Gallery and Museum        | 50         |
|  | Leuven, Musée M                                    | 5          |
|  | Lille, Palais des Beaux-Arts                       | 8          |
|  | Liège, Musée Grand Curtius                         | 8          |
|  | London, Victoria & Albert Museum                   | 120        |
|  | Milan, Sforza Castle - Museo delle Arti Decorative | 105        |
|  | Munich, Bayerisches Nationalmuseum                 | 56         |
|  | Namur, Société Archéologique                       | 7          |
|  | Nuremberg, Germanisches Nationalmuseum             | 40         |
|  | Paris, musée des Arts Décoratifs                   | 80         |
|  | <b>Total</b>                                       | <b>833</b> |

**Table 1. Composition of the corpus**

| Pays          | Lieux de conservation |            |             | Nombre d'objets |             |             |
|---------------|-----------------------|------------|-------------|-----------------|-------------|-------------|
|               | Églises               | Musées     | Total       | Églises         | Musées      | Total       |
| Allemagne     | 334                   | 39         | 373         | 349             | 368         | 717         |
| Autriche      | 2                     | 4          | 6           | 2               | 25          | 27          |
| Belgique      | 189                   | 23         | 212         | 251             | 166         | 417         |
| Chypre        | 20                    | 1          | 21          | 28              | 1           | 29          |
| Croatie       | 8                     | -          | 8           | 11              | -           | 11          |
| Danemark      | 281                   | -          | 281         | 286             | -           | 286         |
| Espagne       | 23                    | 11         | 34          | 24              | 373         | 397         |
| Estonie       | 5                     | 1          | 6           | 5               | 1           | 6           |
| États-Unis    | -                     | 6          | 6           | -               | 97          | 97          |
| France        | 432                   | 20         | 452         | 649             | 153         | 802         |
| Grèce         | 1                     | -          | 1           | 1               | -           | 1           |
| Hongrie       | -                     | 1          | 1           | -               | 1           | 1           |
| Italie        | 240                   | 30         | 270         | 362             | 191         | 553         |
| Lettonie      | 2                     | -          | 2           | 2               | -           | 2           |
| Lituanie      | 1                     | -          | 1           | 1               | -           | 1           |
| Norvège       | 2                     | 10         | 12          | 2               | 77          | 79          |
| Pays-Bas      | 12                    | 10         | 22          | 17              | 57          | 74          |
| Pologne       | 35                    | 14         | 49          | 36              | 68          | 104         |
| Portugal      | 17                    | 10         | 27          | 17              | 72          | 89          |
| Royaume-Uni   | 7                     | 17         | 24          | 10              | 285         | 295         |
| Russie        | 2                     | 1          | 3           | 2               | 2           | 4           |
| Slovaquie     | -                     | 1          | 1           | -               | 2           | 2           |
| Slovénie      | 2                     | 3          | 5           | 2               | 13          | 15          |
| Suède         | 177                   | 12         | 189         | 184             | 74          | 258         |
| Suisse        | 12                    | 3          | 15          | 12              | 6           | 18          |
| Tchéquie      | -                     | 1          | 1           | -               | 8           | 8           |
| <b>Totaux</b> | <b>1804</b>           | <b>218</b> | <b>2022</b> | <b>2253</b>     | <b>2040</b> | <b>4293</b> |

**Table 2. Number of places and objects listed by country and by place of conservation (church or museum).**

### 3.1.1. Nomenclature and protocol for the description of the basins

The few former studies which tried to distinguish some of the alms basins characteristics were not based on any specific methodology. One of the aims of this project was to propose both a simple lexicon and a descriptive protocol to define precisely the objects characteristics. The individual

description of each basin was based on multiple observations, which gathered two types of identification criteria (ID and context markers) and four types of descriptive criteria: technical, metric, morphological and ornamental (**Fig. 1**). These criteria were intended to contribute to get a clearer idea about the technical conditions of production of these objects.

The image shows a screenshot of a descriptive protocol from a project database. It is organized into four main sections: MORPHOLOGICAL CRITERIA, TECHNICAL CRITERIA, METRIC CRITERIA, and COMPOSITION ORNAMENTS. Each section contains a list of criteria and their corresponding values.

| MORPHOLOGICAL CRITERIA |           |
|------------------------|-----------|
| Type of form - general | rond      |
| Type of form - detail  | F15       |
| Rim shape              | R1-rolled |
| Gadroons               | no        |

| TECHNICAL CRITERIA  |   |
|---------------------|---|
| Materials           | metal.copper alloy  |
| Technique           | shaping.cast (sheet)<br>shaping.hammered (sheet)<br>shaping.turned (sheet)<br>ornaments.embossed<br>ornaments.chased<br>ornaments.punched |
| Stamping clumsiness | no  |

| METRIC CRITERIA   |         |
|-------------------|---------|
| Diameter Ø (cm)   | 47.7    |
| Ø MED (cm)        | 19.9    |
| Width RIM (cm)    | 5.78    |
| H. (cm)           | 4.8     |
| Weight (g)        | 2483.8  |
| Thick. RIM (mm)   | 1.7     |
| Thick.center (mm) | 1,3-1,4 |

| COMPOSITION ORNAMENTS |                        |
|-----------------------|------------------------|
| Type of composition   | B. With PUN_1. One row |

**Fig. 1. Screenshot of a part of the descriptive protocol from the project database.**

### 3.1.2. Formal procedures to acquire and to analyze material data

The interpretation of the alloy's composition analyzes relied on the expertise and the equipment of the partner lab (ULG-CEA). Based on the MRAH-KMKG collection as a reference, the project favored the portable X-Ray fluorescence (p-XRF) to perform the analyses, as a guarantee of non-invasive and non-destructive investigation method (**Fig. 2**). As recommended in the historiography, the empirical correction of the fundamental parameters of pXRF were based on a set of standard copper alloy samples CHARM (Cultural Heritage Alloy Reference Material Set). The choice of reference standards used for calibration complied with the following two criteria: the number of standards were sufficient for a good statistical representation of the calibration coefficients of the experimental results and the compositions of the standards were chosen to be as close as possible to the compositions of the materials analyzed. The protocol was particularly based on the work developed by Dr. Arlen Heginbotham, associate conservator of the J. Paul Getty Museum, based on two stages: a first treatment of the raw spectra using the PyMca fundamental parameters software, followed by a calibration of the results with the CHARM standard sample set. This method provided two main characteristics: first reliable results for fifteen common chemical elements present in historic copper

alloys up to 0.05%, as well as obtaining error margins and more importantly, the ability to compare and exchange data from one laboratory to another.

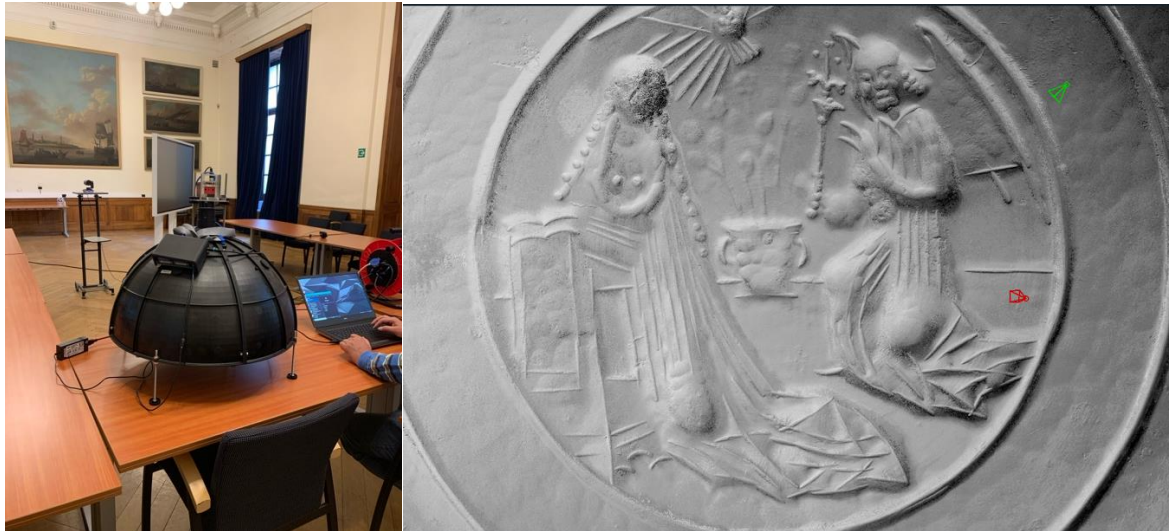


**Fig. 2. Examples of two set-ups for the collections analysis in Glasgow and Brussels.**

### 3.1.3. Explore other techniques to acquire and record material data

Apart from the description protocol and the analyses, few other material and technical-based investigation methods have been tested to obtain more information about specific characteristics of these basins – the ornamental techniques in particular.

The first technique investigated was the Portable Light Dome developed by the Processing Speech & Images lab of the KU Leuven (**Fig. 3**). It allowed a virtual re-lighting inspection and non-realistic rendering of the surface of the basins' backs, where the tools traces are visible. This method contributed to an in-depth understanding of stamping and embossing techniques, as well as the establishing the sequence of ornamental work stages.



**Fig. 3.** The MiniDome set-up and a normal mapping of the back of one of the collection's basins of the MRAH-KMKG.

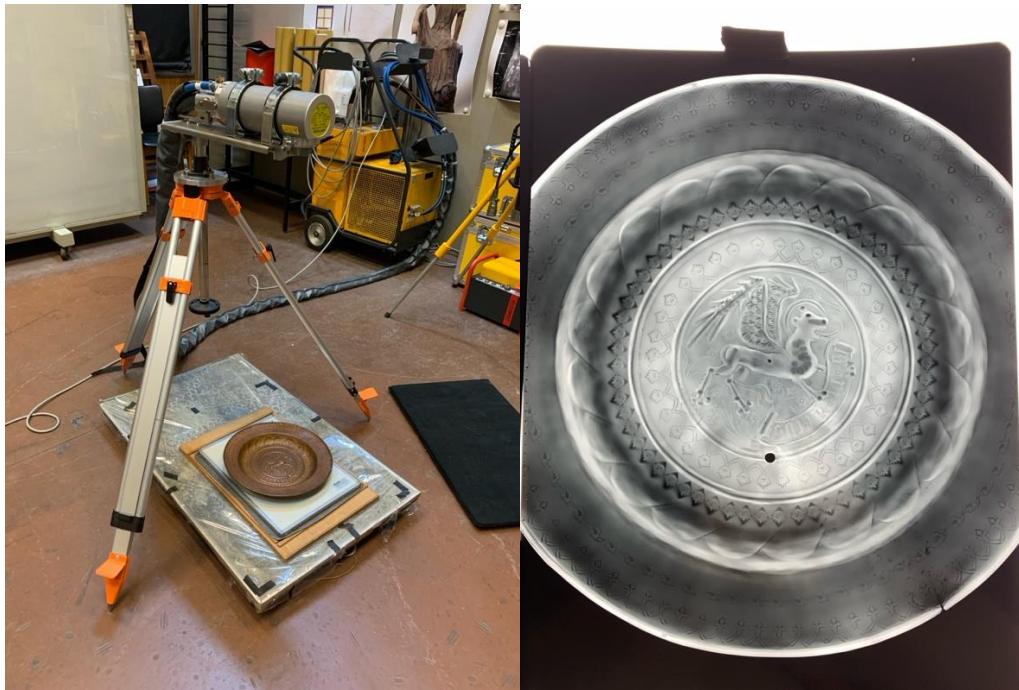
The second technique investigated was related to reproducibility techniques, in order to differentiate serial processes from mass-production processes. The main objective of these tests was to understand the added value of using dies for production profitability. Two scenarios were tested: silicone models and plaster models (Fig. 4). Both provided information about the engraving of the dies and the skills of the craftsmen.



**Fig. 4.** Two models, a plaster one obtained from a 19<sup>th</sup> century replica of a steel die (left) and a silicone one from an original basin from the MRAH-KMKG collection (right).

To further explore the hypotheses obtained from the other two techniques, a third investigation method was used (Fig. 5). Radiographic examinations were carried out at KIK-IRPA on ten basins from the MRAH-KMKG collection to obtain additional information regarding these objects' shaping techniques and the stamping rhythms of the ornaments.





**Fig. 5. X-ray equipment and radiography of one of the MRAH-KMKG's collection basins taken at the KIK-IRPA.**

### **3.2. Historical Data**

The difficulty of studying these basins was partly due to the paucity of information in medieval and modern sources, and partly to the limited scientific perspectives provided by the few previous studies. The examination of these objects therefore required the adoption of a new approach which could take into account all their characteristics (artistic, social, technical, economic and material).

For this reason, interdisciplinary surveys were conducted in different types of historical sources. The study of written sources aimed at identifying two types of information: the techniques, skills and practices of the craftsmen and the use, the trade and the circulation of the basins in northern Europe. The first part of the objective was the more difficult to study through written sources because the methods used by early modern artisans are very poorly documented: no text clearly explained how basins were made, essentially because shaping and ornamenting techniques relied on incorporated skills. Also, the number of preserved archives for metalwork craftsmen activity in Nuremberg and other Belgian cities is extremely low. The research identified a dozen of documents (regulations and treaties) which contributed to shed light on the conditions of production of these basins for different metalwork centers, through the prescriptions issued by the relevant authorities, as well as the "recipes" recommended for the manufacture of copper alloys in the late Middle Ages and early Renaissance.

The second part of the investigation brought more information. More than a hundred documents of various kinds (merchants and churches accounts, inventories, wills, pastoral visits) have been selected from among several hundred for the information they provided on the uses of these objects, the way they were described and named in the texts, as well as their value and status in the late medieval and early modern society.

Another step consisted of enriching and completing the information from the written sources, on how these basins were used, in which context, and to determine their status in society. A large survey gathered 336 images (paintings, miniatures and engravings) from the late 15th to the late 17th century. It explored how these alms basins were represented through late medieval and early modern iconography and questioned the relevance of “realistic” representations. Each image was precisely described through three types of metadata: the identification of the theme and the iconographic subject, the technical description of the image and the description of the basin (shape, model, assumed material, context of use, etc.).

The last step of the investigation concerned the items discovered in excavation contexts. Very few have been inventoried in this particular case, probably due to the recycling practices, common at that time. The few excavations that have been recorded mainly concern consumption contexts. However, the discovery of some 50 brass basins from the cargo of a Dutch merchant ship, grounded off the coast of Portugal, provided an interesting reference for the trade in these objects between the two countries.

#### **4. SCIENTIFIC RESULTS AND RECOMMENDATIONS**

The number of objects collected and studied through the corpus, the various surveys undertaken in historical sources and the material, technical and scientific investigations carried out on these basins have contributed to obtain a representative and significant overview of both the function and role of these basins in late medieval and early modern society, but also the stages and challenges of the organization of production, most of which was intended for the international mass export market.

The PROMATECH project aimed to renew the approach that had been favored until then, in order to adopt another one that was both more appropriate and more promising. The chosen approach of the Promatech project gave priority to the material and technical characteristics of these basins and contributed to re-evaluate these objects for what they really were originally, namely utilitarian items. Taking this original status into account determined as its main objective the recontextualisation of these basins in the socio-cultural, technical and economic contexts of the late Middle Ages and the early modern period.

The collaborations sealed within the framework of the project for the study of the collections were judicious, insofar as they contributed to study unpublished objects which, for the most part, had never been taken out of the museums’ storerooms. The perspectives of this study were therefore also for the benefit of the partner museums of the project, which were provided with new keys to interpret their basins and opportunities to highlight and enhance them from a museographical perspective.

#### **4.1. Technical gestures and skills of the copper-based metallurgy artisans in the late medieval and early modern period**

Two principal observations have emerged from the data generated by the description protocol established for the material and technical study of the basins.

Firstly, most of the basins were not shaped by hammering - as we first thought - but by lathe spinning (by pushing the metal sheet against a recessed form to deform it). This technique requires less specialized know-how and expertise than hammering. In this context, many 'clumsinesses' highlighted on the basins during the material study (stamping defects, overprinting of motifs, inversion of dies, problems with the symmetry and alignment of ornaments, etc.) testify either to a lack of skills on the part of the workforce employed for repetitive tasks, or to sloppy work due to profitability requirements.

Secondly, all the ornaments were applied to the objects by stamping, using dies. None of these dies have been preserved. They were probably made of cast iron. Several hundred different dies were identified, revealing that craftsmen used a very wide range of different ornaments.

These two features clearly ensured standardization and profitability of the production.

We established that identifying the dies that were produced by the craftsmen would help us to identify the workshops. The challenge was to try to determine whether several different matrices had been used to stamp the same decorations (for example the *Annunciation*). If a workshop used and manufactured its own tools, without sharing them with other workshops, the identification of a series of identical matrices would be made possible to identify one or more different workshops. However, this investigation encountered several difficulties: firstly, the wear of the basins and secondly, the apparent evolution of stamping and engraving practices.

However, the measurements taken on the basins help to differentiate between several die formats for different types of ornaments, and to conclude that different dies were used. These variations may result from the use of several different dies within a single workshop, or from the use of several dies by different workshops.

The study of the material and technical criteria of these objects has also shown that the success of this production was based on two main characteristics. In addition to the fact that it was undoubtedly a relatively affordable utensil, the use of a very wide range of iconographic decorations, both secular and religious, allowed these basins to resonate with both domestic and religious environments. In addition, the selection of images, made by the engravers of the dies, belonging to the successful repertoire of engravings at that time also explains the interest of consumers. On the other hand, the very large number of dies helped to highlight the principle of interchangeability of ornaments operated by the craftsmen, ensuring that consumers would never find two identical basins on the market.



Some know-how or technical processes could not be deduced solely from the material and technical data collected on the objects. In some cases, in fact, only experimentation could resolve the hypotheses. The feasibility of archaeological experiments, however, encountered several difficulties: gaps in the functioning of certain stages of the operational chain, which are not documented in the sources, the loss of certain ancient know-how, which are no longer practiced by today's craftsmen and the absence of equivalent dies that could be used to reproduce the working conditions of medieval production. Several remedies, including the use of different technologies using 3D documentation and radiography, were used to overcome these difficulties.

The team had to scale back its ambitions regarding the archaeological experiments, which came up against the availability of the craftsmen available in Belgium and the logistical difficulties of reproducing medieval working conditions identically (inaccessible equipment and know-how). This part of the project was therefore delayed and had to be reassessed. The expected results regarding the reproduction of roughcasts and the composition of alloys could not be verified at the end of the project for the reasons explained above. The time and money initially allocated to carry out this experimental component was devoted to carrying out other types of analyses on the objects, in particular X-rays, providing information to determine the techniques that were used to shape the basins (hammering or turning).

If the protocol used has shed light on most of the processes and techniques used in the manufacture of these basins, an experimental component remains essential to the continuation of the project, in order to test some of the hypotheses which are still unresolved at the end of the project.

#### **4.2. Characterize the materials: alloy diversity, technical constraints and "ranges" of items**

The material and technical data from the objects' observations did not allow us to definitively decide on the existence of a single or multiple workshops, responsible for the manufacture of these basins. This question was complex, insofar as it questioned the definition of the very concept of workshop. One of the challenges of the project was indeed to determine whether the workshop, in the framework of this production, rather referred to the geographical location in which the artisans worked, the physical location where the equipment and tools were located, to a professional or inter-professional gathering, or whether it rather circumscribed skills and a certain level of located quality.

Just over a thousand analyses have been carried out on the objects in the corpus. The main findings were that the alloy composition of these basins is a very pure brass (Cu + Zn) containing very few impurities. Two groups stand out, with slightly different tin contents. This difference can be explained neither by the type of basins nor by their iconography. It is perhaps a chronological component or a different practice between workshops. The composition of the later dishes, whose ornamentation is entirely handmade, is markedly different, with higher zinc amounts and less scattered tin amounts, but broadly equivalent lead amounts.

These results significantly highlight the compositions of alloys from different production centers, from different periods and using different practices.

### 4.3. The organization of the metallurgical craft. Work and market of copper-based products: an overview

An initial part of the investigations carried out in historical sources initially contributed to understanding the historiographical heritage of these basins. After being obsolete at the end of the 17<sup>th</sup> century, they sank into oblivion before being rediscovered two centuries later by collectors, as part of the rise of the neo-Gothic movement. The frenzy that seized these collectors made these basins a must-have in medieval art collections of this period. However, at the time they were collecting them, the scholars had no information to document them. They tried to fill these gaps by carrying out a few studies, which essentially focused on the aesthetic and stylistic characteristics of these objects. Their main concern was to be able to date them and attribute them precisely to a specific period and workshops. However, these issues quickly got bogged down in insoluble hypotheses, because these basins had the particularity of being anonymous.

A second observation quickly became apparent during the material study of the corpus: its the lack of homogeneity. This observation contributed to highlight the existence of two types of basins, which were both highly ornamented, but which were distinguished by the techniques used to create the ornaments: the use of stamping dies for the former and handmade techniques (*repoussé*) for the later (Fig. 6). The stylistic difference between the two productions also suggested that these two types of basins were probably not produced at the same time, nor by the same workshops. They coexisted at the end of the 16th century on the commercial market before the production from the former Netherlands replaced the German production, which was unable to reinvent itself.



Fig. 6. Two types of basins identified in the corpus

The cross-study of historical and material sources has not allowed us to determine precisely when the two types of basin production began. However, all the evidence collected has proven that objects of Germanic origin were already in circulation around the 1460s. In the current state of the collected

documentation, it seems reasonable to suggest that this production must have taken off around 1450 and that it enjoyed constant success for two centuries, until around 1550, before becoming obsolete. It was then replaced by the production from the Southern Netherlands made with using other types of techniques.

The organization and operation of production appear to be highly organized, specialized, by sequences of activities, and highly regulated, according to administrative and legal sources. These basins were mass-produced, mainly for international export and this production was based on standardization and profitability principles.

The statistical and serial observation of the basins studied in the corpus helped to determine the different stages of the *chaîne opératoire*. The production was thus organized into different activity poles, each responsible for a manufacturing stage: casting the blank, shaping it by hammering and/or turning, the ornamentation which included stamping, punching, embossing and chiseling, and finally the finishing stages (polishing). Each pole corresponded to various know-how and therefore the provision of a more or less qualified workforce.

The investigations that have been carried out in the texts, images and excavations have also shown that the basins, described since the end of the 19th century as "offering" basins, had been used in a much broader context of secular and religious practices than this generic name would suggest. They were used both in a domestic context, for practices related to body hygiene (washing hands, feet, hair, newborns, etc.), to serve as a reflector in front of candles, or to present food during meals. In the religious context, they were used in the context of ritual practices (masses and administration of the sacraments), or to satisfy personal devotions (offerings and ex-votos). The versatile nature of this utensil is thus another argument that explains their success.

## **5. DISSEMINATION AND VALORISATION**

### **5.1. Collaborations and networks**

This project federated real collaborations between institutions of different levels of public authorities, for exemplary research on the international scene. First, to increase its visibility on these different scales, the approach was accompanied by a diffusion policy in the field of scientific communication as in popularization. Good practice of gender mainstreaming was integrated in all documentation. The project respected a gender balance and even promoted the presence of women in key decision-making management positions and offered them significant visibility for their research work, both in the composition of its international team (two women in the lead team, a man as a partner) and in the collaborations engaged (of the 16 collaborations concluded with European museums, 11 curators were women and 5 were men). It also offered equal visibility to international researchers (Belgian, French, German, Italian, Spanish, Dutch, Scottish, and English) involved in the project.

Apart from academic network, the contacts and collaborations established during the project have encouraged the integration of the team into three new research networks: CODART for curators of art from the Low Countries, RMBLF reseau des médiévistes belges de langue française and the European Copper Network. These initiatives have helped to raise awareness of the project among both curators and academics at national and international levels.

## **5.2. Courses, workshops and seminars**

One of the objectives of the project was also to raise public awareness about conservation issues and the enhancement of cultural objects. Collaborations with museums contributed to make the results accessible to a wider and a less informed public, through non-academic conferences and classes, showing the importance of studying less prestigious objects, to understand many aspects of ancient societies.

In order to participate in the promotion of research devoted to the study of objects and collections, in connection with the establishment of the Center of Excellence for Decorative Arts of the Royal Museums of Art and History, the postdoctoral candidate was a lecturer at the Royal Institute of Art History and Archaeology of Brussels (IRSHAAB <https://art-histoire.be/arts-decoratifs-10h-3/>) in the second term, teaching a course on Decorative Arts, entitled: For a medieval history of copper and its alloys: techniques, production, materials and craftsmen (10 hours).

Through five sessions, students were introduced to the challenges and perspectives of the study of the ancient metallurgical industry of copper-based objects, from the historiographical heritage of collectors to the omnipresence of these goods in ancient and modern societies. The following themes were addressed:

1. Copperware through historiography. Issues and challenges in constructing a history of copper and its alloys.
2. Techniques and materiality: alloys. Choice of compositions and product “ranges”.
3. Techniques and materiality: objects. Shaping and ornamentation.
4. From the workshop to consumers: functioning of the market and organization of production.
5. Copper alloy objects in everyday life: social and cultural approaches.

The team also participated for two years, together with colleagues from the MRAH Decorative Arts Department, in the “Curatorial Practices” workshop, organized by Laurens Dhaenens for master’s students at KU Keuven. The aim of the workshop was to encourage students to propose and develop exhibition projects based on the museum’s collections, which have the particularity of not being able to be shown permanently due to the specificity of their conservation conditions or the lack of interest they generate among visitors. In addition to the interest generated by the projects that were presented, the relevance and prospects of the initiative were highlighted by the team as a fun, but scientific, way of promoting heritage collections and reconnecting young people with the museum.

## 2022

- Organization of an international research seminar at the MRAH: *Interdisciplinary dialogues. Current research on non-ferrous metal objects in Western Europe (Middle Ages & Modern Times)*.

5 sessions from November 2002 to March 2023.

- Participation in the international study day *Around the notion of artistic filiation*, organized by the University of Neuchâtel on October 21, 2022. "The problematic filiation of utensils made of copper alloy. The case of candlesticks and "offering" basins from Northern Europe (late 15th – 17th century)".

- Participation in the *Journées Mosanes 2022* conference, August 25-26, 2022. In collaboration with Sophie Balace "Metalworking (religious goldsmithing and copperware)".

- Participation in the FNRS *Sculptura* contact group seminar at the University of Namur, April 22, 2022; "The metallurgy of copper alloys: materials, production and craftsmen. Issues, problems and perspectives of scientific methods".

## 2023

- Session chairwoman at the international study day for the 20th anniversary of the European Center for Archaeometry at the University of Liège, May 26, 2023.

- Science@Lunch Conference at the Royal Museums of Art and History, Center of Expertise for Decorative Arts, "Production, Materials and Techniques of copper alloy 'alms' basins from northern Europe (15th – 17th century)", May 11, 2023.

## 2024

- invited speaker for the Société Archéologique de Namur: « Des objets de dinanderie peu connus. Les bassins « d'offrandes » en laiton XVe –XVIIe siècles”. February 15, 2024.

- invited speaker for the course *Conservation of Movable Cultural Heritage*, Dr. Caroline Heering, UCLouvain: "The challenges of preventive conservation of metals in museum collections". March 20-2024.

- Participation in the 36<sup>th</sup> International Congress of Art History of the Comité International d'Histoire de l'Art (CIHA), Lyon about *Materials, Materiality*: "Moins sophistiqués qu'ils n'en ont l'air ? Imitations matérielles, astuces techniques et reproductivité des bassins dits « d'offrande » en laiton des XVe-XVIe siècles”. June 23-28, 2024.

### 5.3. Awards

The PROMATECH project was also the 2023 winner of the Jean-Jacques Comhaire Prize, worth €5,000, awarded by the King Baudouin Foundation to a young researcher for innovative research in archaeometry. The prize is intended to help finance the final publication of the project.

#### 5.4. Collection management

Another concrete benefit of this project is the significant improvement in the conservation conditions of the objects in the MRAH-KMKG collection, most of which are currently stored in the reserves (**Fig. 7**). The study of the collection encouraged an initial assessment of conservation conditions in collaboration with the museum restorer. Then the collection was re-inventoried and benefited from a reconditioning with suitable materials.



**Fig. 7.** MRAH-KMKG basins collection after the reconditioning process of the storeroom.

## 6. PUBLICATIONS

Since gathering the corpus took more time than expected and that the study of the last collection was only carried out at the very end of the project, the exploitation and interpretation of the results remained only partial until the corpus was complete. Winning the Comhaire Prize also encouraged the team to focus on a final publication that would present the project's results in the form of a book-catalogue, which would also be available in open access.

At this stage, four papers are being prepared in peer-reviewed and open access journals or books:

- “Power of Habits and Rhythms in Late Medieval Domestic and Religious Daily Life. Performative significance of brass alms basins inscriptions », dans le *Moyen Âge*.
- « À propos des bassins dits « d’offrandes » en laiton de la fin du Moyen Âge. Enquête interdisciplinaire sur un ustensile polyvalent », *Bulletin de l’IRPA*.
- « Un atelier ou des ateliers ? Étude matérielle et technique des bassins « d’offrandes » (XV<sup>e</sup> – XVII<sup>e</sup> siècles), *BUCEMA*.
- « La filiation problématique des ustensiles fabriqués en alliage de cuivre. Le cas des chandeliers et des bassins « d’offrande » d’Europe du nord (fin XV<sup>e</sup> – XVII<sup>e</sup> siècle) », dans *Autour de la notion de filiation artistique. Actes du colloque du 21 octobre 2022*, accepted and reviewed, published by the end of 2024.

A final publication is currently being drafted (**Fig. 8**) and intends to benefit from the Comhaire grant to contact publishers by the end of 2024.

|   |           |
|---|-----------|
| <b>I. Présentation du corpus</b>                              | <b>3</b>  |
| <b>Composition/répartition</b>                                | <b>3</b>  |
| A. Le corpus d'étude  | 3         |
| B. L'inventaire général                                       | 21        |
| <b>Les indices historiques de recontextualisation</b>         | <b>25</b> |
| C. Les poinçons   | 25        |
| D. Les dates  | 26        |
| E. Les inscriptions   | 26        |
| F. Les marques et les symboles                                | 26        |
| <b>Nomenclature des objets et mesures</b>                     | <b>26</b> |
| G. Terminologie   | 26        |
| H. Parties et éléments constitutifs des objets                | 27        |
| <b>II. Les objets</b>   | <b>50</b> |
| <b>Les techniques</b>   | <b>50</b> |
| I. La fabrication   | 51        |
| - La mise en forme  | 51        |
| - L'ornementation   | 51        |
| - La finition   | 51        |
| - Les réparations   | 51        |
| <b>Les décors</b>   | <b>51</b> |
| J. Les médaillons   | 51        |
| - Les inscriptions  | 52        |
| - Les frises  | 63        |
| - Les ornements de formes complexes                           | 63        |
| - Les poinçons  | 63        |
| - Les godrons   | 63        |
| - La composition ornementale                                  | 63        |
| - Les éléments rajoutés                                       | 63        |
| <b>III. Usages domestiques</b>                                | <b>63</b> |
| <b>1. Sur l'identification de ces bassins :</b>               | <b>63</b> |
| K. Période mérovingienne (tombes)                             | 70        |
| - Au Moyen Âge central  | 70        |
| - Bas Moyen Âge   | 71        |
| <b>Usages domestiques</b>                                     | <b>72</b> |
| L. Utilisations liées à l'hygiène                             | 72        |
| - Signification des usages domestiques                        | 76        |
| <b>Éclairage</b>  | <b>76</b> |
| M. Bassins comme réflecteurs !! = uniquement l'iconographie ? | 76        |
| <b>Les usages détournés, ou indéterminés</b>                  | <b>77</b> |
| N. Le cas problématique de la suspension                      | 77        |
| <b>IV. Usages religieux</b>                                   | <b>79</b> |
| <b>Éclairage</b>  | <b>79</b> |
| - Bassin comme chandelier pour mettre des chandelles :        | 81        |
| O.  | 83        |



|  |           |
|--|-----------|
| - Une mise en réseau programmatique des objets au sein des églises _____ | 88        |
| - Statuettes pour âme du Purgatoire _____                                | 90        |
| - Les plats avec tête de saint Jean-Baptiste _____                       | 90        |
| <b>V. Annexe _____</b>   | <b>91</b> |
| <b>1. Index correspondance corpus _____</b>                              | <b>91</b> |
| <b>2. Annexe sources objets _____</b>                                    | <b>94</b> |
| <b>3. Annexe sources images _____</b>                                    | <b>94</b> |

**Fig. 8. Table of contents of the final publication draft of the project.**

## **7. ACKNOWLEDGEMENTS**

The PROMATECH project is a 24-month project funded by the federal science policy office (BELPSO). We would like to thank first the project evaluators of the BRAIN program and the members of BELSPO who monitored the project.

Promatech has developed an interdisciplinary approach and research tools that optimize the understanding, the valorisation, and the accessibility of copper-based alloy collections both for academia, curators and the public. The project could not have been carried out without the essential collaboration of part of the project partner's lab team, in particular Grégoire Chêne for the valuable assistance he provided in exploiting the data and providing support during the research trips.

We also warmly thank all the curators of the collections that were studied, for their welcome, their interest in the project, the crucial discussions about the objects and the hypotheses that they were kind enough to share with the team. In alphabetical order: Dr. Sophie Balace, Dr. Raphael Beuing, Josep Capsir, Dr. Aurore Carlier, Benedicte Dierickx, Carmen Genten, Dr. Silvia Glaser, Edward Johnson, Pauline Juppín, Dr. Kirstin Kennedy, Sophie Loock, Angus Patterson, Guenevere Souffreau, Dr. Adam Stead, Verena Suchy, Dr. Francesca Tesso, David Thomson, Dr. Heike Zech and Dr. Michaela Zöschg.

Many fellow curators have contributed to the enrichment of the project inventory by providing information on the presence of basins in their collections. They are too numerous to list them all, but the project team want to express its true gratitude and to thanks to them for their contribution.

Other academic colleagues were patient enough to answer many specific questions about inscriptions, techniques, or the provenance of these objects. They helped keep the working hypotheses alive until the end. Some of these hypotheses would never have found solutions without the valuable contribution of the craftsmen we met during the project (Jacques D'Haegeleer, Patrick Storme, Hanne Schonkeren).

Moreover, the team is particularly indebted to colleagues working both in the MRAH-KMKG and CEA ULiège, who have contributed to feed this project on a daily basis through their experience and regular exchanges in the framework of the Decorative Arts department research group, the conservation and management of the collection, the administrative and financial management of the project and the transversal approach of the collection.

Lastly, we would like to thank the members of the follow-up committee (Dr. Patrick Cassitti, Dr. Joanna Olchawa, Arie Pappot, Dr. Patrick Storme and Dr. Heike Zech) for their interest, participation and support to the project. The contacts with the follow-up committee mainly took place through individual discussions with its members, depending on the team's needs on specific issues, for advice, information, references, or contacts. Some members were thus more solicited than others during the discussions and depending on the progress of the project.

## **ANNEXES**

Grant attribution from the King Baudoin Foundation

**Fondation Roi Baudouin**

FONDATION D'UTILITÉ PUBLIQUE

Agir ensemble pour une société meilleure

**Convention****2023-P2813310-229732**

46311

Une convention est établie entre :

la **Fondation Roi Baudouin**, n° d'entreprise: 0415.580.365, fondation d'utilité publique, ayant son siège rue Brederode 21 à 1000 Bruxelles et représentée par Brieuc Van Damme, administrateur délégué, agissant dans le cadre de :

**Fonds Professeur Jean-Jacques Comhaire**

et le Bénéficiaire

Anne-Clothilde Dumargne

Avenue du Maelbeek 7 37 à 1000 Bruxelles

titulaire du compte FR7630003020370005151596423 SOGEFRPP

La Fondation s'engage à soutenir le projet du Bénéficiaire selon les modalités suivantes :

\* Montant TTC de:

**5.000,00 EUR (cinq mille EUR, zéro cent)**

\* Projet soutenu:

**PROMATECH - Production, matériaux et techniques des bassins martelés décorés en alliages cuivreux d'Europe du nord (XVe – XVIIe siècles)**

Étudier les bassins dits 'd'offrande' d'un point de vue technique/matériel afin de mettre en évidence les pratiques/savoir-faire des artisans et le marché commercial de l'époque tel que décrit dans le dossier de candidature/projet.

\* **Conditions générales:** voir document en annexe\* **Conditions spécifiques:**

voir annexe

Ce montant sera considéré comme définitivement acquis dès approbation par la Fondation d'un rapport d'évaluation devant lui parvenir au plus tard le 31/10/2023.

Fait à Bruxelles, le 24/01/2023, chaque partie déclarant avoir reçu le sien.

Anne-Clothilde Dumargne

**DocuSigned by:**

8B0600FA17B4488...

  
Brieuc Van Damme  
Fondation Roi Baudouin

En cas de problème ou pour toute question, vous pouvez toujours contacter **Alice RYELANDT**, mail: ryelandt.a@mandate.kbs-frb.be

**Annexes:**

- \* Conditions générales
- \* - Rapport d'évaluation
- Conditions spécifiques