



# A LOOK BACK

## 140 Years of “Photogrammetry” Some Remarks on the History of Photogrammetry

by Joerg Albertz

In the Fifth Edition of the Manual of Photogrammetry, published by the American Society for Photogrammetry and Remote Sensing in 2004, we find an opening chapter entitled “A Brief History of Photogrammetry.” It gives a very condensed overview about the historical development of our discipline. In the subsection 1.3 about “Early Developments in Photogrammetry” the following statement is given with regard to Albrecht Meydenbauer and the origin of the term “Photogrammetry”– “In Germany, Dr. A. Meydenbauer was first to give his attention to the new method of photographic surveying. He published a paper on this subject in 1893 in which the first use of the word photogrammetry appears.” The impression of the historical facts given by these sentences is neither complete nor entirely accurate. Therefore, the purpose of this article is to give more detailed information about the activities of Albrecht Meydenbauer and, in particular, the first use of the term “Photogrammetry”.

### Albrecht Meydenbauer – Inventor of Architectural Photogrammetry

Albrecht Meydenbauer (Figure 1) was born in 1834 in Tholey, a little town in Germany. After his studies at the Bauakademie (School of Architecture) in Berlin, he became a building surveyor for the Prussian government. One of his first assignments was the documentation of the cathedral in the city of Wetzlar. In September 1858, while he was working, he had an accident and almost fell down from the side-aisle of the cathedral. Following this dramatic episode, it occurred to him that the direct measurements at the façade could be replaced by indirect measurements in photographic images – thus the basic idea of photogrammetry was born (Albertz 2001, Meyer 1985)

From that point on, Meydenbauer devoted his activities to the realization of this idea. In 1860, he wrote a memorandum about the documentation of buildings through photography to the curator of cultural heritage in Prussia. He described how photographic images can store the object information in great detail and with high accuracy. He was also aware of the risks to which cultural objects are exposed. He therefore developed the idea of a “Denkmälerarchiv” (Cultural Heritage Archive) where the most important cultural heritage objects should be recorded in metric images in such a way that they could even be reconstructed in cases of destruction. However, Meydenbauer had a long and difficult way to go in order to develop methods and instruments for the technical realization of his method. He had to fight against many obstacles and critical voices, before his idea was accepted as a documentation method and he found governmental support.



Figure 1. Albrecht Meydenbauer (1834 – 1921) in mid life.

In the course of this development, Meydenbauer designed cameras with all the main features that characterize a photogrammetric instrument, namely

- the definition of the image plane by means of a mechanical frame, against which the photographic plate is pressed before exposure;
- the integration of an image coordinate system, realized as cross hairs that are imaged on the photoplate during exposure;
- a compact camera design with a fixed focus in order to define the principal distance (or calibrated focal length);
- mounting on a tripod with the possibility to adjust the camera axis horizontally, the image plane vertically, and one of the image coordinate axis again horizontally.

These technical solutions formed the basic elements of all photogrammetric cameras later on. Furthermore, Meydenbauer saw that architectural objects could only be appropriately covered by the use of wideangle lenses. It was in 1867 when the first instrument was built by the optical workshop of Emil Busch in Rathenow, a town near Berlin. This camera was equipped with the newly designed Pantoskop wide-angle lens.

With this instrument Meydenbauer performed practical tests during the summer of 1867. In the town Freyburg-on-Unstrut, about 180 km southwest of Berlin, he recorded metric images of the town church, and for topographic purposes he also photographed a sector of the surrounding terrain. In these tests the method proved to be a success, and Meydenbauer could now provide evidence that photogrammetry is suited for architectural surveys and for topographic data acquisition as well. In the context of these experiments the term “Photogrammetry” was coined.

Despite the promising results of these studies, Meydenbauer did still not find acceptance for his method. Many practical experiments and technical improvements of the cameras followed. He still used the Pantoskop lenses with focal lengths of 25 cm, 35 cm and 53 cm. The image format was enlarged up to 40 x 40 cm (Figure 2). Large formats were desirable because of the accuracy to be achieved through graphical restitution.

Finally, more than 25 years after his first idea to apply photographs for the documentation of buildings, Meydenbauer succeeded. After several debates in the Prussian Parliament House, devoted to the photogrammetric documentation of cultural heritage objects and the accuracy that can be achieved by this method, the parliament granted the money to establish a photogrammetric institution in Berlin. Meydenbauer was appointed by the Prussian Minister of Culture as the director and he became responsible for applying photogrammetry to the documentation of cultural monuments. On April 1, 1885, the “Königlich Preussische Meßbildenanstalt” (Royal Prussian

Photogrammetric Institute) was established, the first photogrammetric institution in the world.

Meydenbauer continued to improve his instruments. In 1886 he started to build a new generation of cameras. He abandoned the stable camera housing and introduced a camera design which was capable of being dismantled for transportation purposes. In these instruments, the exact position of the lens relative to the image plane was ensured by a system of adjustable steel rods. The camera body was replaced by a light-proof textile bag (Figure 3). An interesting new feature was the introduction of a vertical shift of the lens. This enabled him to achieve a better adaptation to the object, a technique which was used in many photo-theodolites in the following decades. The image format was 40 x 40 cm, but for various applications, especially for expeditions, also 30 x 30 cm and even 20 x 20 cm cameras were built. Each camera was equipped with a transportation box designed to hold it. Manufacturing was carried out in the workshop of the institute. The cameras were operated with great success for many decades, but unfortunately all those that were used by Meydenbauer and his staff were destroyed during World War II. Only two cameras, delivered to Switzerland in 1898, survived (Grimm 1978).

Between 1885 and 1920 the "Meßbildanstalt" recorded about 2,600 cultural objects in about 20,000 photogrammetric images on glass plates. This collection of historical photogrammetric images is absolutely unique. In the following decades, in particular during and after World War II, the archive passed through an adventurous history. It even was displaced for some years to Moscow, before it was given back to Berlin. Today the famous "Meydenbauer Archive" is under the care of the "Brandenburgisches Landesamt für Denkmalpflege" (State Office for the Preservation of Historic Buildings in Brandenburg) in Waldstadt, a town about 30 km south of Berlin.

In 1909, Meydenbauer retired at the age of 75. He published a textbook (Meydenbauer 1912) and finished his professional activity after a life of fulfillment, characterized by many years of experimental work and struggle for acceptance, but also by great success and high appreciation. He was honored as Dr. phil. h.c. by the University of Marburg (1885), as Dr.-Ing. h.c. by the Technical University of Hanover (1908), and he received the honorary title Professor by order of the German Emperor (1903). In addition, he was awarded numerous high orders and decorations in recognition of his work.

## About the Origin of the Term "Photogrammetry"

Meydenbauer began his investigations into the use of photographs in measurement without any knowledge about the activities of Aimé Laussedat, a military engineer in France. As early as 1851, Laussedat had begun experiments to use images for topographic mapping purposes. In the early period he worked with hand drawn images, acquired with the help of an optical tool for perspective drawing, the "camera lucida". He named his method "Iconométrie". Later he started to apply photographs, and in 1859 the prototype of a topographic camera was built to his specifications. It is therefore generally accepted that Laussedat is the "Father of Photogrammetry". However, he called his system "Métrophotographie". Other names applied to the method in subsequent years include "Photométrographie" and "Photographométrie".

One of the first publications on the subject was printed in the "Wochenblatt des Architektenvereins zu Berlin" (Weekly Journal  
*continued on page 506*



Figure 2. The French Cathedral in Berlin, a photograph taken by Meydenbauer in 1882. 100 years later the image was used for reconstruction purposes because the church was heavily damaged in World War II.

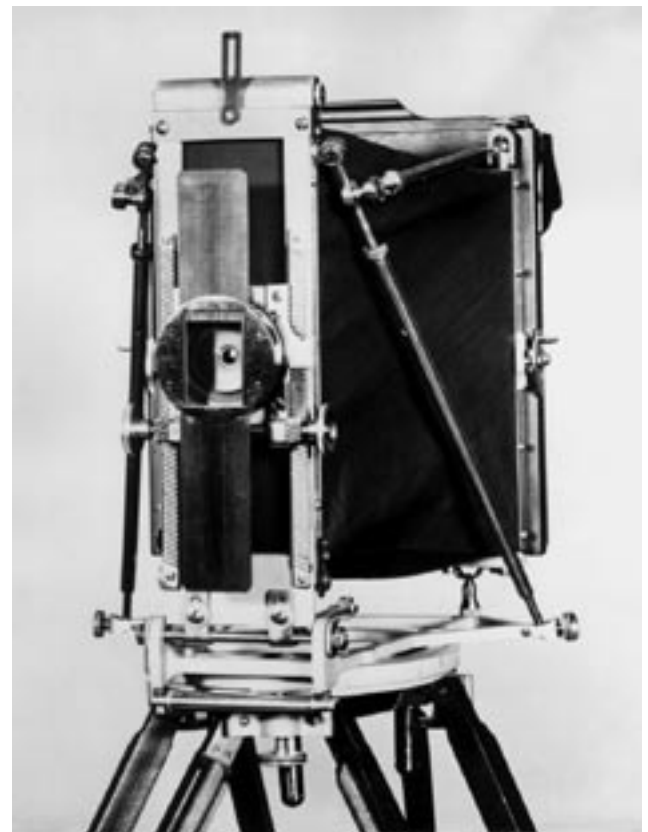


Figure 3. A later model of Meydenbauer's cameras, built around 1890.

of the Association of Architects in Berlin). In No. 14 from April 6, 1867, an article by Meydenbauer appeared under the title “Die Photometriographie” (Figure 4). It was in the following months that he worked at Freyburg-on-Unstrut, taking metric photographs of the town church and the terrain as well. It happened that during the graphical restitution of the images Meydenbauer was visited by Dr. Otto Kersten, a geographical explorer. Kersten was fascinated by the demonstration and immediately realized the importance of the method. He evidently found the name “Photometriographie” too complicated, however, and proposed to replace it by the much more convenient term “Photogrammetrie”.

Obviously Meydenbauer accepted this proposal. Very soon after meeting with Kersten, he published in the same journal “Wochenblatt des Architektenvereins zu Berlin” a paper entitled “Die Photogrammetrie”. The article appeared in No. 49 from December 6, 1867 (Figure 5). It is amusing to see that the editors of the journal made a comment in form of a footnote (Figure 6). It states that the name Photogrammetrie is significantly preferable to Photometriographie, but, in their opinion, is still not a completely satisfying characterization of the method. This critical opinion of the editors met with little agreement, and soon after that the term Photogrammetry was adopted in all languages worldwide to describe the technique of performing indirect measurements by means of photographic images.

## Conclusion

Coming back to the historical remarks mentioned in the introduction, we can make the following statements.

Despite the fact, that Aimé Laussedat is generally understood as the inventor of photogrammetry, it is evident that Albrecht Meydenbauer is another important pioneer in this field. He invented the principles of photogrammetry in 1858 independently from Laussedat and developed methods and instruments especially for

architectural photogrammetry and the documentation of cultural heritage objects. Furthermore it must be noted that he introduced as early as 1867 the term “Photogrammetry”, which soon became the worldwide accepted title of our discipline.

P.S. A final historical reminiscence may be added. Albrecht Meydenbauer had a brother Wilhelm who emigrated to the U.S. as a young man. Many years later he settled in Seattle and became a successful businessman. This is why in Bellevue near Seattle we find the Meydenbauer Convention Center and the Meydenbauer Yacht Club which is located at Meydenbauer Bay.

## References

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Figure 4. The weekly journal of the architects association in Berlin. Title page from April 6, 1867, with the paper “Die Photometriographie”.



Figure 5. Title page of the same journal from December 6, 1867, with the paper “Die Photo-grammetrie”.

\*) Man vergl. No. 14—16 d. Wochenblatts. Der Name Photogrammetrie ist entschieden besser gewählt als Photometriographie, obgleich auch noch nicht ganz bezeichnend und zufriedenstellend.  
 (D. Red.)

Figure 6. The footnote from the editor, stating that the term photogrammetry is much better than photometriographie but still not satisfying.