

AS IMAGENS COMO FONTE PARA O CONHECIMENTO DA EVOLUÇÃO DAS TÉCNICAS DOS CANTEIROS¹

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Palavras-chave: Mínimo de 3 e máximo de 5 palavras-chave separadas por vírgulas.
Exemplo: Instruções, Património construído, Projetos Contemporâneos, Diretrizes

Resumo: *O lapidador prepara a pedra, dando-lhe a forma desejada de maneira a antecipar o trabalho dos pedreiros. Ele trabalha diretamente nos locais de corte, ou seja, na pedreira, na saída da pedreira ou em canteiros de obras. A lapidação da pedra consiste em várias etapas de corte, como esquadrejamento ou desbaste, usando diferentes ferramentas, cada uma com funções e usos específicos. A profissão de pedreiro tem origem na pré-história. Estudos arqueológicos revelaram que o homem já havia assimilado dois dos princípios mais importantes na lapidação de pedras: a modelagem e a debitagem. No entanto, as ferramentas e métodos evoluíram à medida que o homem aprendeu a controlar melhor a rocha, mas a originalidade da profissão de pedreiro reside na coexistência de ferramentas usadas desde os tempos romanos com as de hoje. Contudo, desde a revolução industrial na Inglaterra, a natureza da profissão de pedreiro mudou. Passou a existir uma transferência cultural de tecnologia e uma divisão de tarefas, que tem resultado na transformação do modo de vida dos trabalhadores, mas também na forma de trabalhar a rocha, com o aparecimento de novas máquinas e uma nova forma de organizar o trabalho. O objetivo deste trabalho é, portanto, compreender como essas técnicas e ferramentas mudaram ao longo do tempo através da análise das imagens em que essas técnicas estão representadas. A natureza das imagens também evoluiu com o tempo, e, por esse motivo, não temos os mesmos materiais de estudo para todas as épocas históricas. Se para a antiguidade podemos estudar a traceologia dos blocos, na Idade Média, as iluminuras são uma fonte preciosa. Para os tempos modernos,*

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temos desenhos, gravuras e pinturas e, para o período contemporâneo, para além deste tipo de imagens existem ainda fotografias e mesmo filmes. Contudo, é necessário considerar a imagem não como uma ilustração da realidade, mas estudá-la como um objeto histórico real, situando-a no seu contexto.

The image is most often considered as a simple fact of historical illustration and not as a source itself. Moreover, it is illusory to consider the image as a simple reflection of reality, even if it is rich in information such as on the positions and gestures studied, information that a text will not necessarily give. The image is above all a vector of social representations and must be questioned in this sense; it must be put in perspective and in series. The theme of stonemasonry is an interesting case study because it has its roots in the most ancient times and seems to be intrinsic to the nature of men. In the Middle Ages, stonemasons had a very different social status from masons and other workers. This study therefore aims to present the techniques of stonemasons and the ways in which they are represented over time. We therefore propose to make a history through images. In this way, we will be able to understand better how this profession has changed over the years. We will also be able to ask ourselves in what way images play an important role in the understanding of technical and industrial knowledge and finally, to conclude this analysis, we will be able to ask ourselves if it is possible to think about the future nature of the image that we will be able to use for the study of this theme and, by extension, of technical and industrial heritage.

THE DANGER OF “INTERPRETATION”

We need to understand how dangerous the interpretation of an illustration can be. To do so, let's have a look at this image (Figura 1) which is a drawing of both a duck's head and a rabbit's head. The author of this drawing is not known, and it was published on October 23, 1892, in the German newspaper *Fliegende Blätter*. It is intended to confuse the viewer; indeed, an optical illusion has been deliberately created to deceive the observer and prove that an image can be interpreted differently depending on who is looking at it. But if the image can be deceptive, it is all the more important to interpret it, without attributing to it “a false world of 'meanings'” (Susan Sonntag²). To avoid that, it is necessary to study the image as a true historical object, i.e. to put the image in its context but also its nature.

André Gunthert specifies this idea by showing that the nature of the images has an important role as for the interpretation of the information that we can make of it, because the will and the choice of representation carried out by the author are guided by the support even of the image. He says that “it is obvious to any contemporary that any identifiable motif present in a painting, a sketch or an engraving has necessarily been the object of a choice attested by the act of drawing, so the phenomena revealed by the experiment of the magnifying glass show that the image provided by the photographic instrument is of a different nature from that produced by the art”³. The drawing is the result of choices made by the author while the photograph is subject to other conditions, which are not necessarily under the author's control. The nature of the images being thus varied, the interpretation will not be the same.

² Susan Sontag, *Against Interpretation*, 1966

³ André Gunthert, « Une illusion essentielle », dans *Études photographiques*, n°34, Printemps 2016



Figure 1: Unknown, « Welchem Thiere gleichen ein : kaninchen und Ente », (source : Fliegende Blätter, October 23, 1892)

STONE CUTTING, ANCIENT ORIGINS

The human ingenuity to control the environment can be seen on the hard rock tools found during archaeological excavations and prospecting. Indeed, the stone keeps a faithful and definitive trace of the actions it has undergone. Thus, thanks to tracery, the study of tool marks on cut stones, we can better understand the different techniques that are the genesis of the stonemason's craft. Archaeological studies show us that man had already assimilated two of the most important principles in stone cutting: shaping and cutting. For the cutting, there is the direct percussion with the hard stone hammer on the material held by the cutter or the direct percussion with the hard stone hammer on the material placed, sometimes on an anvil. These techniques, discovered and learned since the Paleolithic period, are the basis of all the other techniques that were to develop and succeed one another. The Levallois method is one of those techniques, it is the first representation of a meticulous stone cutting method, thought out and conceived in a standardized way. This method is a cutting technique that consists of a meticulous preparation of the initial stone block, the nucleus (by removing splinters that are then only waste), before extracting the useful splinters, called "Levallois splinters", which will be used as tools. The discoveries in petro-archaeology also show that man already differentiated the nature of the rock itself, because the quality of the rock was decisive for its final use⁴.

STONE CUTTING IN THE GRECO-ROMAN WORLD

If we look at the Greco-Roman world, we can see that it has left us an ancient imagery of stoneworkers. However, Jockey Philippe⁵ noticed that this ancient imagery has most often been studied for its aesthetic quality. This imagery has been used by historians as an illustration, but it has not been considered as a "history-producing" image. However,

⁴ Benito del Rey Luis, Benito Alvarez José-Manuel, « La taille actuelle de la pierre à la manière préhistorique », dans Bulletin de la Société préhistorique française, tome 91, n°3, 1994. pp. 214-224. Nițu Elena-Cristina, « Considérations générales concernant la technique Levallois et ses produits. Principes généraux de réalisation et représentations dans le Paléolithique moyen de la Roumanie », dans Annales d'Université "Valahia" Târgoviște, Section d'Archéologie et d'Histoire, Tome 8-9, 2006. pp. 164-189. Musée départemental de préhistoire d'Ile-de-France, site internet : <https://www.musee-prehistoire-idf.fr/fr>

⁵ Jockey Philippe. « Les représentations d'artisans de la pierre dans le monde gréco-romain et leur éventuelle exploitation par l'historien », dans Topoi, volume 8/2, 1998. pp. 625-652

the funerary stele of the sculptor Amabilis as well as the tomb of Eutropos give us two different images of stonecutters.

The first is the limestone funerary stele by the sculptor Amabilis, dated to the middle of the second century (Figure 2). It was found during excavations carried out at the Roman rampart on rue Guillaume-Brochon in Bordeaux in 1826 and is currently kept in the Musée d'Aquitaine in Bordeaux under the inventory number 60.1.82. The sculptor in question is in a seated position, in front, depicted carving the left pilaster of his naïskos, indeed, with his right hand we can see that he is about to strike with a mallet the chisel he holds in his other hand. The pilaster capitals that adorn the four corners are carved in a flattened form where many tool marks were left visible, probably deliberately, revealing the use of the pick, the gradine or the chisel, in order to remind the commemorator of his work as a stonecutter after his death.



Figure 2: Eutropos' funeral relief, n°40674, (source : Museo lapidario du Palazzo Ducale)



Figure 3: Amabilis Headstone (II century), n° 60.1.82, (source : Musée d'Aquitaine, Bordeaux)

The second image (Figure 3) is the funerary relief of Eutropos, which comes from the catacombs of Rome. This one is kept in Urbino, in the museo lapidario of the Palazzo Ducale, inventoried under the number 40674. This time a sculptor is represented, helped by an assistant, under the direction of a master builder. The assistant is crouched down and pulls alternately on the two ends of the rope wrapped around the drill to set it in motion. This relief is an interesting witness to the hierarchy of functions among stonecutters, but it also raises a technical debate: there is a tool placed on Eutropos' leg

that could be either a drill or a guide. If it was a guide, then the latter would effectively allow the control of the drill held by the assistant to prevent it from slipping.

A first attempt to interpret these techniques was made by the canon and archaeologist Raffaele Fabretti in 1699, who left us a drawing of the stele of Eutropos (Figure 4). However, the representation of the stonemasons and their techniques became more numerous from the Middle Ages onwards, thanks to the art of illumination.



Figure 4: Copy of the funeral relief of Eutropos by Raffaele Fabretti, 1699

STONECUTTING IN THE MIDDLE AGES

The corpus of medieval imagery that we have constituted for this analysis consists of six details of illuminations, all of which are preserved in the National Library of France⁶. We have found it useful to integrate into this corpus personal photographs taken on the blocks used in the construction of the Mosteiro dos Jeronimos, which represent the distinctive signs possessed by the stonemasons.

This illumination (Figure 5) is a detail from the book entitled *La Bouquechardièrre* written by Jean de Coucy in 1460⁷. This manuscript divided into six books tells the story of the Greeks and Romans from the period of Creation to Julius Caesar. In this picture, stonemasons are shown at the bottom of a construction site. We see three different types of tools including a square, a compass and what looks like a polka or hammer-polka, a direct hit tool used by stonemasons. The polka is used to square and face soft stone with its vertical cutting edge. To cut recesses and clear moldings, stonemasons use the polka on the side where its cutting edge is perpendicular to the handle. From the 14th century onwards, but especially in the 15th century, it was frequently fitted with teeth and was then called a Breton polka. This tool is composed of a metal blade with two cutting edges, one perpendicular to the handle, the other parallel. The blade of the simple or “brettée polka” is mounted on a handle of about 50 cm long. As shown in medieval images, the handle is held with both hands. By the end of the 14th century and even more frequently in the 15th century, many stonemasons wielded the polka while seated on round stools with one or three legs. Such a posture makes the work more comfortable while seated. Although not specific to the stonemason, various tools are used to calculate and mark out the dimensions and shapes of the block to be cut. Thus, there are several wooden models of rulers or, as shown in this illumination, the compass which allows the tracing of construction lines, curves, the transfer of points, etc. It is not unusual for the tailor to have several of different sizes. The square is also very useful to the stonemason for the elaboration of a block with perpendicular faces between them, but also to check the good squaring of the various stages of size. The stonemasons are thus represented at the bottom

⁶ BnF Passerelles, « les tailleurs de pierre au moyen-âge », BnF, Direction de la diffusion culturelle, Éditions multimédias, 2020.

⁷ The original manuscript is lost, but there are thirty-five known copies. Several of these copies were illuminated by the workshop of the master of the Échevinage of Rouen.

of a building site, outside, in a "natural" landscape. Most stonecutters are free men with no ties, recruited according to their abilities by the master builder or the master mason who directs the site.



Figure 5: Illumination detail from *La Bouquechardière de Jean de Coucy*, 1460 (source : BnF)



Figure 6: Illumination from *l'Histoire romaine*, 1400. (Source : BnF)

This illumination (Figure 6) probably dates from 1400 and its author is not known. It comes from the Roman History and depicts a construction site in the Middle Ages, most certainly at the time of the construction of Rome. In the foreground is represented the operation of rendering. We see a cutter marking with an awl and a ruler the cut to be made on a block of stone while a companion checks its verticality with a plumb line. This is one of the first steps in cutting the block into a parallelepiped. The cutters work with other trades.

This illumination, dated 1485, represents the roughing operation, i.e., obtaining the desired size of the block for the needs of the construction site. This means that the excess material is cut away. This illumination also represents the treatment of the stone using the polka. To work more easily, the stones were raised on already finished blocks. The roughing is also the moment when the mouldings, the ornaments, are prepared, this time with a chisel and a mallet.



Figure 7: Illumination from 1485. (Source : BnF)

This first series of illuminations (Figures 5-6-7) shows that in the Middle Ages, the use of stone became widespread, especially to avoid fires, which were all too frequent with wooden constructions. Stone masons and masons became the most sought-after craftsmen, under the command of the "master mason" because he was the only one capable of moving from the horizontal plane to the elevation. They tend to form an aristocracy of the building at the end of the Middle Ages and sometimes enter in conflict with the masons.

We can still linger on three other illuminations (Figures 8-9-10): one from Ancient History to Caesar and Facts of the Romans (1460-1465), another by the illuminator Jean Fouquet (1470-1475) and a third dated from the second quarter of the 15th century which illustrates the event of the construction of Troy.



Figure 8: Illumination detail by Jean Fouquet, 1470 (Source : BnF)



Figure 9: Illumination detail from Histoire ancienne jusqu'à César et faits romains (Source : BnF)



Figure 10: Illumination detail, 2nd quarter of the 15th century (Source : BnF)

The first image (Figure 8) is a detail of the construction of the Temple of Jerusalem which strongly resembles a cathedral. It is an overview of a cathedral construction site. We see the preparation of the mortar, then the stone cutters roughing the blocks with sledgehammers, cutting with a chisel, measuring with a compass etc. The second illumination (Figure 9) represent the construction of the Tower of Babel and shows a carver adjusting the edge of a block with a tool called a shave. The shave is a hand-held percussion tool since it does not require a striker. It is made up of an iron rod whose ends, flattened and bent in opposite directions, constitute the cutting edges. This tool is always held with two hands, the right hand pressing vertically on the tool near the cutting edge, the left hand pulling it towards it or to the side. Thanks to the specific marks left by the shavings on the facings and on the mouldings, it is attested that this tool was used quite commonly in the 14th and 15th centuries. This tool was used for finishing the beds and leveling the stone faces as well as for making the moldings. The third illumination (Figure 10) which represents the reconstruction of Troy illustrates the squaring stage, with the help of a bretture.

Each stonecutter (but also each quarryman) had a distinctive sign which he engraved on one of the faces of the cut stone⁸. When the cutter was hired on a per job basis, these marks allowed the site manager to check the quality of his work and to count the number of squared stones to pay him accordingly. The variety of signs used is great. They are geometrical figures such as triangles or pentagons, work instruments such as the pick or the hammer, crosses, letters, perhaps the initial of the worker. Here you can see a collection of these distinctive signs that were photographed during a tourist visit to the Hieronymite Monastery in August 2021.

⁸ Chauvel A, « Étude sur la taille des pierres au moyen âge », dans Bulletin Monumental, tome 93, n°4, année 1934. pp. 435-450. EQIOM, « être maçon au Moyen-Âge », site internet : <https://www.guidedumacon.fr/le-comptoir-des-macons/etre-ma%C3%A7on-au-moyen-%C3%A2ge>



Marques tailleurs de pierre du Mosteiro dos Jerónimos © Photos Personnelles.

Figure 11: Stonemason's marks of Mosteiro dos Jeronimos, 2021, (source : Julie Prévost, private photographs)

TOOLS AND METHODS, A MODERN AND CONTEMPORARY REPRESENTATION OF STONE CUTTING

All these tools that we have already seen will continue to be used (Figure 12). The Encyclopedia of Diderot and D'Alembert⁹ becomes an important source of it because under a format of several plates, these last ones are going to be represented in addition to new methods of cuts and the obtained product. A major work of the 18th century, the encyclopedia was published from 1751 to 1772 and consists of 17 volumes of text, whose articles are arranged alphabetically, and volumes of 11 engravings, arranged by theme. It is conceived as a vast system of classification, hierarchy, and apprehension of human knowledge. The genesis and publication of the Encyclopedia are situated in a context of complete renewal of knowledge. Indeed, the representation of the world commonly accepted in the Middle Ages was then gradually called into question. The plates that interest us are grouped under the theme "Masonry, marble". We can see the different tools used in the cutting of marble, but also methods such as this extraordinary mill that saws the stone slabs (Figure 13). All its mechanism is then described. Other machines are also represented, this time mainly concerning architecture and masonry, such as this wheel used to transport blocks and this drilling of column bases.

The encyclopedia also proposes two engravings, one representing a marble workshop and the other a construction site (Figure 14).

⁹ Diderot, Denis, Alembert D'. *L'Encyclopédie. Maçonnerie, marbrerie. Recueil de planches sur les sciences, les arts libéraux et les arts mécaniques, avec leur explication.* Bnf

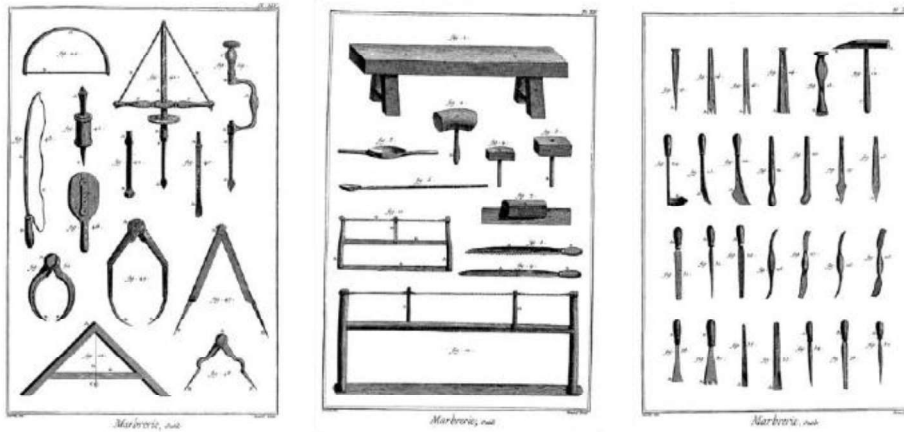


Figure 12: tools to cut the marble. (Source : Encyclopedia, Diderot, D'Alembert)

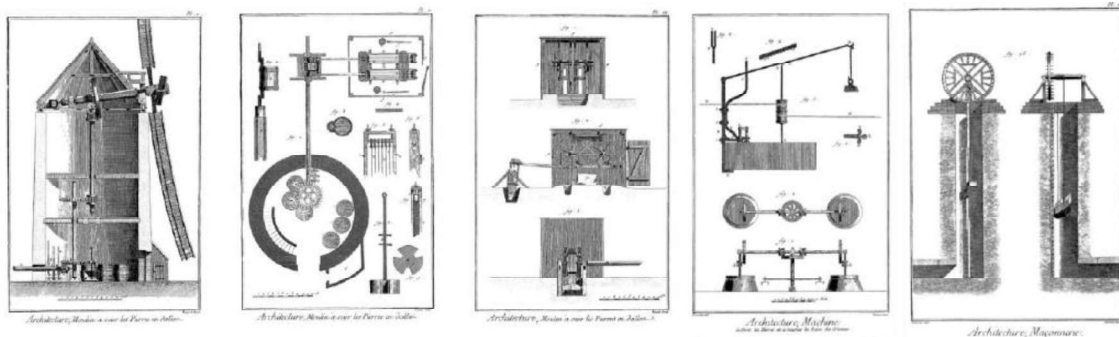


Figure 13 Tools and methods to cut the stone (Source : Encyclopedia, Diderot, D'Alembert)



Figure 14 Left: Engraving of a marble transformation and cutting workshop. Right: Engraving of a construction site and representation of the masonry. (Source : Encyclopedia, Diderot, D'Alembert)

As far as the workshop is concerned, we see blocks and slabs of marble scattered here and there in an open area. In the background we see the presence of a "shed" where it is possible to "work under cover". Different stages of the treatment of the stone are visible: the sawing of the blocks, the measurement of the blocks, the size of a tomb. The

construction site represented here is quite different from those we have studied so far. The drawing is more reasoned, respecting scales and proportions. The absence of color is noticeable: the eye is not distracted by color but is now drowned in the abundance of information. The stonemasons are represented alongside the masons who are busy mounting the cut stones, building a wall, covering it with plaster, as well as many other laborers used in the construction of buildings. The encyclopedia also proposes a plate of the art of the cutting of the stones (Figure 15). This is the science of tracing, of which one of the oldest witnesses is the notebook of Villard de Honencourt (Figure 16). This science of the line, named the stereotomy, will be enriched by several treaties, of which that of DE la Ruë in 1728, which answers a royal request (Figure 17).

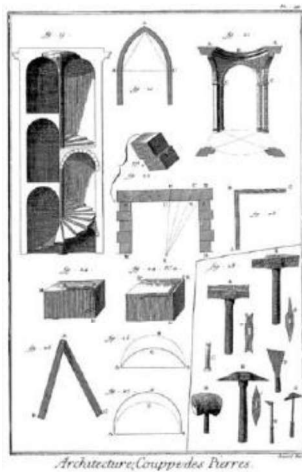


Figure 15 Plate in the Encyclopédie for the art of stone cutting. (Source: Encyclopédie, Diderot, D'Alembert)

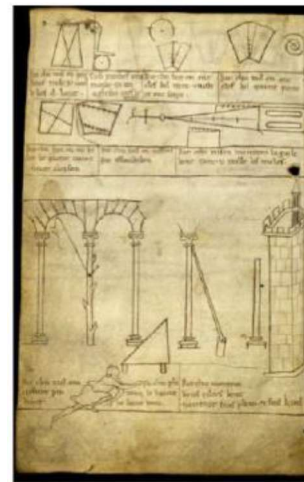


Figure 16 Villard de Honnecourt, Tracé de construction, (source : BnF, folio 40)

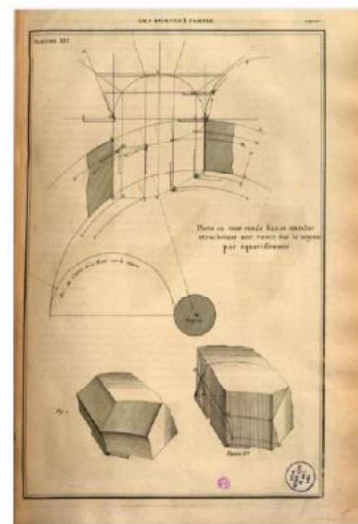
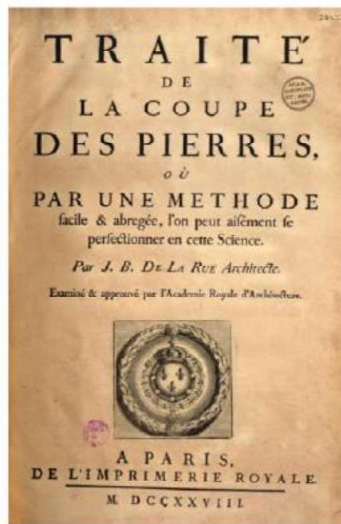


Figure 17: J. B de la Ruë, *Traité de la coupe des pierres*, Paris, imprimerie royale, 1728 (Source : Bnf)

The stonemasons were indeed represented in the paintings or drawings showing palaces, places of royalty, because their presence means grandeur, majesty. These places being in perpetual enlargement and construction, the participation of the stonemasons in

the construction of stone walls, makes them contribute to the royal influence. We can see it on the picture which represents in the foreground the stone cutters just in front of the castle of Compiègne (Figure 18).

Photographs, new sources of images, allow us to compare the methods and tools of past times with those of present times. For example, this photograph from the beginning of the 20th century (Figure 19) shows us the continuity of use of certain tools, such as this saw, which is represented on the drawing of the Château de Compiègne (Figure 18).



Château de Compiègne. © Hippolyte Destailleur (collectionneur, XIX e siècle). Dessin à la plume et lavis à l'encre brune ; 9,8 x 14,8 cm, BnF, département des Estampes et de la photographie, RESERVE VE-26 (1)

Figure 18: Entrance of the castle of Compiègne (Source : Bnf)



Atget, Eugène (1857-1927), *Tailleur de pierre*, 1899 - 1900. Bibliothèque nationale de France, département Estampes et photographie, BOITE FOL B-EO-109 (17)

Figure 19: Eugène Atget, Man in front of a saw and a block of stone (Source : BnF)

FINAL REFLECTION: A NEW TYPE OF IMAGE FOR TECHNICAL AND INDUSTRIAL HERITAGE?

With the advent of new technologies, new modes of representation for technical and industrial heritage have been developed, such as photogrammetry. One of these new representations is the virtual image. It would make it possible to make of the technical and industrial object a final digital product by a work of digitalization of the data. This virtual image would be the occasion to become a virtual *thesaurus* and could be useful in

the projects of valorization and safeguarding in industrial archaeology and to be posed in alternative to the problem of conservation and storage of the machines.

TO CONCLUDE

What we must retain from this rather succinct analysis of the representations of stonemasons and their techniques is first the multitude of supports and images on which we can rely on to develop an historical study. These are rich in information, as much on the techniques as on the methods and even inform us of the social and economic role of the stonecutters.

REFERENCES

[1] Susan Sontag, *Against Interpretation*, 1966

[2] André Gunthert, « Une illusion essentielle », dans *Études photographiques*, n°34, Printemps 2016

[3] Benito del Rey Luis, Benito Alvarez José-Manuel, « La taille actuelle de la pierre à la manière préhistorique », dans *Bulletin de la Société préhistorique française*, tome 91, n°3, 1994. pp. 214-224. Nițu Elena-Cristina, « Considérations générales concernant la technique Levallois et ses produits. Principes généraux de réalisation et représentations dans le Paléolithique moyen de la Roumanie », dans *Annales d'Université "Valahia" Târgoviște, Section d'Archéologie et d'Histoire*, Tome 8-9, 2006. pp. 164-189. Musée départemental de préhistoire d'Ile-de-France, site internet : <https://www.musee-prehistoire-idf.fr/fr>

[4] Jockey Philippe. « Les représentations d'artisans de la pierre dans le monde gréco-romain et leur éventuelle exploitation par l'historien », dans *Topoi*, volume 8/2, 1998. pp. 625-652

[5 -6] BnF Passerelles, « les tailleurs de pierre au moyen-âge », BnF, Direction de la diffusion culturelle, Éditions multimédias, 2020.

EQIOM, « être maçon au Moyen-Âge », site internet : <https://www.guidedumacon.fr/le-comptoir-des-macons/etre-ma%C3%A7on-au-moyen-%C3%A2ge>

[7] Chauvel A, « Étude sur la taille des pierres au moyen âge », dans *Bulletin Monumental*, tome 93, n°4, année 1934. pp. 435-450.

[8] Diderot, Denis, Alembert D'. *L'Encyclopédie. Maçonnerie, marbrerie. Recueil de planches sur les sciences, les arts libéraux et les arts mécaniques, avec leur explication*. Bnf