# Remodeling and Virtuality in Descriptive Geometry

Andrea Donelli
Department of Civil, Environmental and Mechanical Engineering, University of Trento (Italy), Trento, Italy
Email: andrea.donelli@unitn.it

***Abstract*—In descriptive geometry the concepts of remodeling and virtuality can not be simplistically defined and applied to continuous graphical operations based only on external or formal visualization results. The discussion of a scientific results as regards the descriptive drawing has the aim of obtaining an image or multiple images projected on the plans as derived from specific geometric relations and by in-depth connotations related to the investigation on the object of study. The graphic aspect - geometric concerns a matter that first of all it is regulated by a method defined by the biunivocal relation of projection and section and consequently by a process. Impersonate or draw scientifically means in fact to acquire and determine the knowledge of the shape of the object, of geometric entities respecting the intrinsic rules. There may be a scientific basis if the process is not preceded and supported by an acquired and consolidated methodology. The method therefore intends to establish a relationship of cause and effect and as a final result, through the operations process chart geometric - lead to the result reported to the final image. The concept of re-modeling approaches also that of virtuality and in this way it is possible to discuss again in scientific terms and penetrate the reports and determinations regarding for example to the survey on an object in a Duplicate relationship of model designed as technical structure - acquired scientific and as outcome related to a process of experiences in which it makes concrete and defined in its image projected on the planes. The scientificity of a program and the consequent operations of study may not be such if the terms do not make them compatible with all of the steps in a process whose systematic structure is as first thing the method necessary and useful for understanding and knowledge through the image in the form of the object made such by a process of unification of methods of representation and observable also in the investigation of study. These instructions give you basic guidelines for preparing camera-ready papers.**

***Index Terms* —- geometric and parallel projection and homological relations, virtual remodeling in descriptive geometry, - draw for understanding and knowledge -graph model /pattern**

## I. Introduction

The objective of this discussion is to highlight the need to consider in the lexical terms and applications the concept of remodeling and virtuality in descriptive geometry. In every science, as well as in every discipline in which is to be addressed the concept of remodeling it has a precise meaning which goes first investigated and then applied in the different cases studio. This definition helps to solicit and to compare the theoretical issues and objective. Even the concept of virtuality assumes signs similar to that of remodeling, it approaches in parallel at the end of remodeling since both causes secure inside them graph - geometrical details of association. For example the virtuality falls in particular in the method and in the analytical method referred to the calculation in the science of constructions, useful in the resolution of the structural systems compounds both by rigid bodies which by deformable bodies and is applicable for both materials in linear elastic behavior that non-linear. In descriptive geometry the determination of those aspects that relate to the remodeling and virtuality relates to the structure of the model defined by the system of representation and the subsequent determination of the concept of image that plays another projected pattern and as last consequently determines the display. The model concept in its duplicity is the key that allows you to investigate, pull off the road and consider the remodeling defined by models as well as from their virtuality. The models are manifested in that set decreed by their possible solutions graph - geometry. In some cases the processes occur in the absence of substantial changes of the characteristics morphological and functional conditions of the structure concerned and shall be limited to a replacement of elements of its architecture, as occurs in ordinarily phenomena of renewal due to the projection of images that can ensure the preservation of their true greatness and/or the true shape (forms relating to metric). In other circumstances a remodeling ago following the loss of the metric values, as well as there may be geometric aspects are descriptive in which the same model designed as a structure that contains the values (metric) of true greatness exist for other projections also the values not metric. For virtuality does not mean the simulation systems, images, this reference or approach would be a wrong and misleading consideration and very typical of those aspects exclusively procedural and methodological not.

## II. The Concept of Remodeling

The remodeling in descriptive geometry is given by many facts; from the whole of the structure defined by a first method of representation used to describe a real

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object of study to a second or third passage to another method, thus constituting a systematic representation unit, as well as by the modifications of the image projected on plans from the relationship defined by the systems of geometric representation methods. This procedure constitutes the descriptive and projective foundation defined by the correspondence between projection and section. The image projected and represented on the planes will constitute the result obtained from a method and from a particular type of research and observation. In fact, with the remodeling method it is possible to obtain different images from the different graphic representations which in turn determine a relationship of belonging with the real object. The images projected in this way are remodeled and this phenomenon constitutes a way of observing the object represented. For every single representation corresponds a value attributed to the type of investigation performed. In this way the represented object coming from the structure of the different methods will allow to observe both the morphological characteristics of the object and its specific position on the planes so that it satisfies the geometric graphic relations and specifically the introspective relationships that form the object thus represented.

## III. The Concept of Virtuality

The term virtuality derives from the ancient latin-medieval historical language *virtualitas* or virtual. It is a definition that corresponds to the contrast of real. This concerns an effective question, not opposed to reality. The virtuality in descriptive geometry defines the images from reality through the projection on the plans. This fact also determines a process of remodeling of the same images that are reprojected in turn on the different infinite planes, both orthogonal and inclined. Therefore virtuality has a double correspondence. The first concerns the passage from one representation system to another, this passage remodels the system of representation methods for reconfiguration; while the second aspect considers more images projected and observed in different ways on the different planes considered. The virtuality is not only a theoretical question or method but it is also a process in the experience geometric graph of parallel connections with reality. In fact, it employs the same principles to satisfy both analytical and graphic properties. The virtuality addresses scientific issues and therefore should not be confused with the term or with the operations of the simulation. A principle of virtuality in descriptive geometry becomes explicit when the geometric graphic representation of an object is traceable not only metrically to the reality of the object itself. It means that between the reality and the virtual representation the represented object possesses the same prerogatives, not always similar, but analogous, comparable with the objectivity, therefore the characteristics of the reality of the object represented are conserved with its characters described as of the parts or as a whole. This aspect is necessary for the object to be investigated, understood and known.

## IV. Discussion

The discussion is constituted on how to analyze, by means of a scientific path decreed by the systematization of methods and procedure charts and geometrical representation, knowledge relating to particular causes that relate to the description of the object, understood both in the space generated, which unitarily and consequently in the representation of the architectonic object observed and extracted. The object therefore is analyzed as a whole that defines multiple and extensive reports that relate mainly to the construction of the physical space and the perceived. In this way you determine shapes, images, figures, which interpret the object by means of a set of events that organize and concur to define other and still continuous and contiguous relations. The object in synthesis emerges from the relational duplicity given by the space in which it is inserted and with which it relates according to areas deduced from its documentation, as it is perceived through the known, felt and even internalized reality; one passes from hermeneutics, that is to say, a sort of interpretation concerning the architectural object which, in its many operations of decomposition and consequently of comparison between the parts and its successive fractional parts rendered abstract, the individual components of the object away, away, fall fully acquiring subjective values, the latter should be the result of a cultural base of the observer. These different steps and operations of nature graph geometric - lead the subject to continuous variations of position, metric and non-metric and perception. Therefore the remodeling of the object and the individual parts you reconfigure through processes of abstraction of the object up to assume the relations of virtuality that allow the graphical models related to systems structural geometric which guarantee the method or methods of coded representation relating to the institutions and quantities that, even if they do not correspond to the amount that is verifiable in true greatness (metric), may be introduced and considered for certain graphic purposes, representation and logical deduction. For example the case study on the design of the model in parallel projection, became for practical reasons such as operation application exclusively as the axonometrics, returns through the thought of research in particular of historical thought modern Of the architecture as well as for the artistic thought on Cubism, the pragmatic necessity and usefulness determined by the immediacy of the represent through the oblique drawing isometric, the different positions of the different elements that constitute the architectonic object investigated. In fact, the cultural research relating in particular to the cubism adheres to full title to the theoretical sphere of representation and perception, and in this his investigate the object as aesthetic phenomenon by using the parallel projection considered as a direct application in axonometry gives importance to an ancient system and pursues ideally what is classic. The axonometrics thus conceived is to be considered a classic theme? In this case it can be said that it becomes a synthesis of a thought

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that is a proper placement within the wide classical culture and tradition of parallel projection. The model in parallel projection *versus* the model in axonometry according to the usefulness of the cubism is a classic attitude as its specificity to represent accurately the object the Redeem from the instrumental use, the island by external factors which contaminate the research, fixated on intrinsic research because only the object represented and supported by the triad is able to reveal his extraordinary complexity and singularity. The *versus* for clarity indicates the directing, the transmute into a process chart - geometric. Also in this harmony we can reconsider the intellectual path of Le Corbusier, and even before Eugène Emmanuel Viollet-le-Duc, so as Auguste Choisy, relatively to the use of the oblique drawing. After this introduction that is the maximum synthesis concerning the result of a cultural process referred to practice an axonometric view, the discussion focuses on the validity of the remodeling and of virtuality that sees the geometric structure descriptive of the parallel projection at the center of the matter discussed here. Fig.1

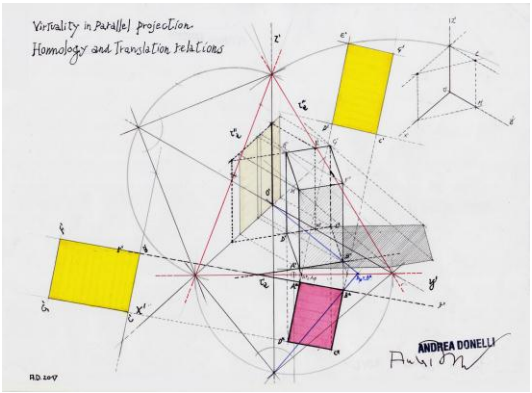


Figure 1. Drawing a Model in parallel projection with homology; relationships between projected entities. Drawing by Andrea Donelli.

The object initially faced and studied in its geometric reality, understood in true greatness and true shape, finds its scientific confirmation and concrete as a geometric model as a result of a projection and a consequent image on the plane. This is the famous case of the method and of the method of the double projection of Monge. The geometrical model was in this manner described and delineated according to the logical fees belonging to the methods and processes of the descriptive geometry graphics. This model will arrive at one of its descriptive definition to relations arising from the methods employed and by the logic defined by methods used. The double orthogonal projection of Monge secures a dual connection between the institutions and the magnitudes while preserving the model understood as a system of structure and maintaining the model derived from the relationship of projection and section i.e. the image transmission result of entities on the planes. In this case we will also have a relationship of simple homology, that is, of a similar relationship, whose meaning is a logical correspondence between two things, so that what happens in one is repeated in the other because of the same logic. Of particular interest in the process of remodeling and virtuality of the models is the exercise referred to the orthogonal projections with the homology and the consequent overturning of the trace tα" on plane π'. In this case it is obtained with the tracking of the volumes of the entire system, even the volume of the overturned figure on plane π'. The volumetric model thus obtained corresponds to a remodeling and to a virtuality integrated into the system. Fig. 2

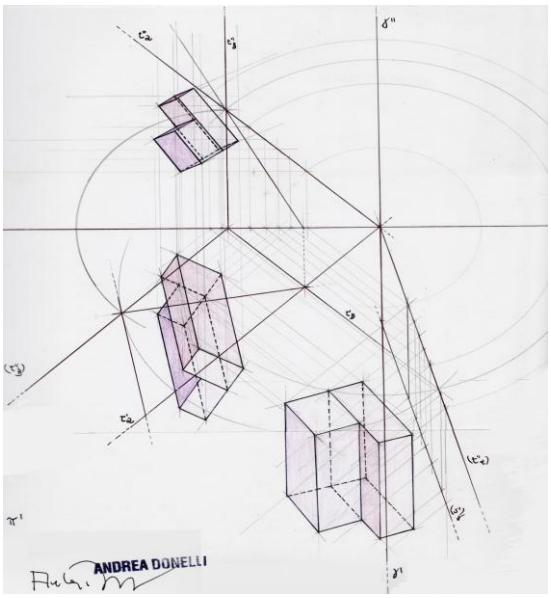


Figure 2. Drawing a model projection Orthogonal projection with homology. Drawing by Andrea Donelli.

This report does not fixed metrics in this remodeling of the Variants intuitively and perceptually possible and random not related to the new image of the model in this way determined. The processes of representation in orthogonal projection with the homology allow you to determine the relationship of remodeling and virtuality of models. In the Unification of Methods of representation it is possible to determine from the parallel projection a continuity and contiguity of the methods and processes to obtain additional modeling defined by passage graph geometric - to the orthogonal projection with the homology with necessary rollover plans. The reciprocity and the duality relating to chart properties geometric - allow you to store and to consider in continuous methods and in the mutual relations aimed to the study and the introspection of an object, in this case is considered as an object, the architectonic object, a real demonstration of how it is the point of departure of quality and quantity. The parallel projection via the operations graph geometric-constitutes the foundation on which is based the application also practice of the axonometric projection, it is referring to the axonometric projection orthogonal, since it is determined by the demonstration of the triangle of the traces or essential. This orthogonal model referred to the parallel projection is determined by the structure of the axial triad system x '; y '; z '; and from the traces or the intersection of the planes that are configured with the degrees of inclination of the angles in a biunivocal relation with the axes so that the model itself determines its orthogonal axonometric characteristics. Fig.

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3 From the drawing of a model corresponding to a figure in the first projection positioned on the horizontal plane in true size and shape; through the process of projection and section protrude the entities and the quantities that they build the model. The result projected and consequently displayed will be of a three-dimensional figure.

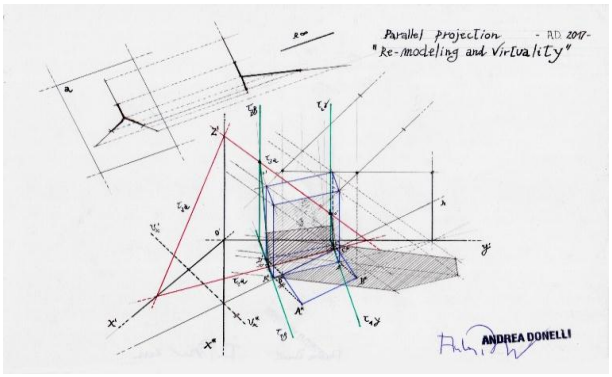


Figure 3. Drawing of a model in parallel projection. The construction of the model constitutes a principle virtual since it is comparable with the reality as the figure in the first projection positioned on the horizontal plane is in true size and shape; through the process of projection and section projection the entities and the quantities that they build the virtual axonometric model. Drawing by Andrea Donelli.

The latter model does not have characteristics metrics found but will be the outcome of values not metric equally proportioned and graduated as derived from true magnitudes and from real form. In essence this process of remodeling determines a virtual abutment as you can define and put this subject on a given plane and therefore consider it as a virtual outcome because congruent with the reality of belonging. This location is a sort of control and determination of the facts that you are abstract and rendered necessary for a particular study and survey on the object. With the definition of architectonic object you intend to investigate graphically and geometrically those requirements of space and recognizability of an architecture which is only schematically shown as figure of a regular polygon, and that only the geometric design descriptive scientifically arranged allows you to investigate and represent. Fig.4

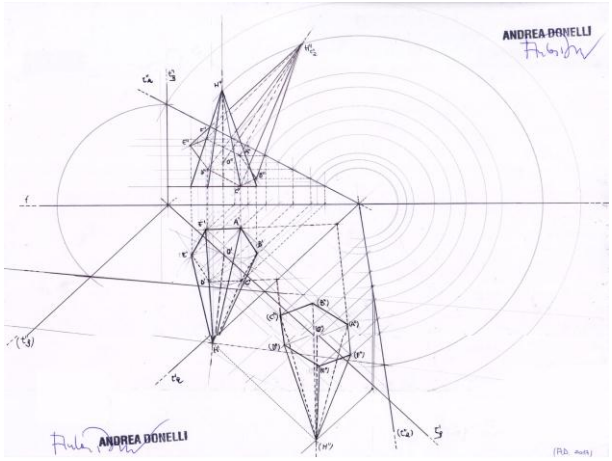


Figure 4. Drawing of a model of a hexagon shaped conic shape in orthogonal projection with homology and double projection of Monge. Drawing by Andrea Donelli.

## V. Conclusions

As for the parallel projection also for the orthogonal projection with the homology and on the necessary processes graph - geometrical tilting it is possible to refer to studies relating to the architectonic object, by arranging with the scientific methods of representation required to pass from one system to another. In this way it constitutes a whole, a unit, also by unifying and relate to the methods graph - geometric type of study and survey conducted on the subject. This phenomenological aspect that also within gnosiological is reported to experience graphic geometric-stands within the intuitive experience, which looks at all the phenomena associated with the way to perform and describe an experience as points of departure and continuous checks to extract from them the essential characteristics from the experiences, i.e. to allow the essence, the synthesis of what is experienced. From this basis it causes a further stage very complex for the architecture as it can deal with studies and research always conducted on the architectonic object that relate and refer to the topology, questions on new questions on how to represent these facts in the graphical process, geometric topological -. Finally, the investigation relating to the architectonic object considered through the instrument of descriptive geometry and projective allows a relationship between models made such by their process graphic and geometric fit and be defined as virtual experience. The Virtuality is directly compared with reality, therefore is not and does not mean simulation that for the latter is the outcome of a technicality, since it is not corresponding to reality and not corresponding to the actual objectivity.

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**Andrea Donelli** he is an architect and PhD, he teaches in the course of degree in Building Engineering-Architecture and Research at the Department of Civil, Environmental and Mechanical Engineering of the University of Trento. Has done lectures at the Polytechnic of Milan, at the University of Udine and held seminars at universities and cultural institutions. He also participated in international conferences on the themes of drawing and relief, on the issues of drawing the city and living. He is the author of writings and essays focusing on the themes of representation and geometry descriptive including: Drawing to Restore and Representing Urban Green Space in Santa Cruz de Tenerife, Rational Drawing and Design: Notes for the Representation of Architecture, The Analysis for the Project: Investigation Technique, Fundamentals of Descriptive Geometry: Applications for Architecture and Engineering, Represent a Mental Geometry: Comprehend and Draw the Topological Space and Architectural Environment. Has also published the following monographs: Observations on the descriptive geometric drawing, (Ed. Aracne Roma), Drawing Survey & Representation (Ed. Aracne Rome) and a graphic-literary introspection entitled: With Aldo Rossi in the infinite detail, (Ed. Clean Naples).

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