“Mesurer la Solidité”: the Art of Measuring Buildings in Belgium, 1451-1960

Dirk Van de Vijver

For centuries, the *edificie-meter* (“mesureur d’édifices”, quantity surveyor) played a crucial role in the building world of the Southern Low Countries and the Prince-bishopric of Liège. Skilled in both arithmetic and geometry, this professional measured the quantities of the work done by the building craftsmen in order to define accurately the precise amount due from the patron. In this contribution we want to focus on the social and technical aspects of this “building” profession, forgotten by (Belgian) historiography on architecture and construction (for England see Nisbet 1989 and Nisbet 1997), and clearly distinct from land surveying (Mosselmans and Schonaerts 1976, De Graeve and Mosselmans 2001, Mosselmans and Godding 2001) and from setting out the plan for the foundations of a building on the site in mediaeval times (Binding 1985).

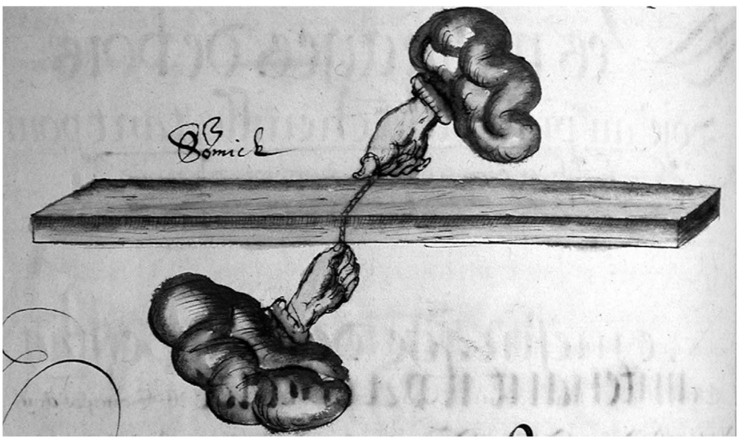


Figure 1. Measuring wood, illustration in the stereometry section of the 1605 Le Coeulre manuscript (UG, Ms 2244, p. 444)

THE OLDEST TESTIMONIES

The oldest city accounts available for the Low Countries contain traces of the activities of quantity surveyors. In Bruges, the city accounts of 1297-8 mention the measuring by *agrimessores* of the digging and building of the new fortifications. In 1316-28 *landmeitere* (land surveyor) Michiel Bigghe measured the building of the city gates and surrounding structures. In Ghent, anonymous *landmetere* were paid every year in the period 1327-33 to measure the executed stone paving of roads (Viaene 1966, p. 7).

However, the oldest codification of the legal position of the surveyors as experts in servitudes and other specialized interventions regarding real estate in Belgium, the ordinance of the city of Brussels dating from 2 December 1451, also called *Statuyt vanden meerers* [“emborneurs”] *van de stadt Brussel*, does not specify the work of the quantity surveyor (Mosselmans and Godding 2001). The ordinance of 19 April 1657, which replaced the former of 1451, is more detailed. Article 93 on the way to estimate houses (“Maniere van Huysen te schatten”), describes in a very rudimentary way the activity of the quantity surveyor:

> Om de voorsz. Schattingen te doen, sullen de voorsz. Meerers alle de Materialen, op de Goeden oft Gronden staende, op-schryven ende schatten: te weten de Metselrye ende Daken by Roeden, de Timmeringen by Honderden, den witten Steen ende Glas by voeten, het Yser ende Loot by Ponden, ende ’t Schryn-werck ende Slot-werck by Priseringhe, ende soo voorts, begrypende alle de voorsz. Materialen in een somme, hoe veel de selve ’t samen komen te bedraghen […]
>
> (To execute the formerly mentioned estimations, the mentioned surveyors will write down and estimate all the materials on the site, to know: masonry and roofs in *roeden* (“verges”), carpentry in hundred feet, the white stone and glass in feet, the iron and lead in pounds, and the joining and locking by price, etc. the result will be one amount representing the total value of all the mentioned materials [...])
>
> (Schonaerts 1980, pp. 26-7).

In 1657, the estimation of houses and other possessions belonging to orphans was attributed in Brussels exclusively to the “emborneurs jurés” (Mosselmans and Schonaerts 1976, pp. 109-10). The ordinance of the administration of the city of Antwerp of 15 January 1618 specifies the role of the sworn quantity surveyor, as the one who measures and controls the work after its construction, and stresses his neutrality (he is not allowed to have conflicting interests with the craftsmen before the contractor receives its last payment:

> […] Ende d'werck volmaeckt synde sal t'selve ghemeten ende gevisiteert worden by geswore erf-scheyders ende meters, niet suspect wesende van eenich verstant met de wercklieden te hebben, al eermen den voorsz. Aennemer syne leste betalinge doen sal. […]
>
> (Brants 1912, pp. 366-97, ch. X art. 12)

GEOMETRIA PRACTICA AND STEREOMETRIA

The importance of this field of applied mathematics is also illustrated by its explicit mentioning in the title of the (so far as known) first book on geometry in Dutch. *Die waerachtige const der Geometrien leerende hoemen alderhande breydden, lingden, dicten, ende hoochden Der velden*

Beemden Bosschen Berghen Metselrien Paueyselen Torren Huysen Kercken ende alderhande dinghen meten sal. Hoemen oock maken sal die wynroede, Om daer mede te roeden alderhande Tonnen Vaten Cuyppen backen ende dier ghelijcke (The true art of geometry, learning how to measure all sorts of … masonry, paving, towers, houses, churches ….) was published in Brussels in 1513 by Thomas van der Noot, who probably also compiled it. It was a practical treatise in the tradition of the Roman aggrimensores and intended for surveyors and gaugers. Book VI, *De elementis geometriae,* of Gregor Reisch's *Margarita philosophica* appears the main source of the text (Bockstaele 1984). The title page also shows the application of mathematics, with people measuring all sorts of objects: the figure on the right seems to measure something which appears to be a cubic volume of stone **(fig. 2)**.


Die waerachtige const der Geometrie leerende
hoemē alderhāde/drepōdē/figdē/dictē/eñ hooch
dē Der veldē Beemden Bosschē Berghē Metselriē
Paueysele Torren Huysen Kercken ende alderhan
de dinghen meten sal. Hoemen oock maken sal die
wijnroede/Om daer mede te roeden alderhande Tō
nen Vaten Cuyppen backen ende dier ghelijcke

Figure 2. Front-page of the first printed treatise on geometry in Dutch, *Die waerachtige const der Geometrie* (The true art of geometry, 1513) by Thomas van der Noot. At the right, a quantity surveyor measures building parts (Bockstaele 1984, p. 82)

The quantity surveyor belonged to the specialists who applied geometrics in practice by operations like measuring (measurers) or making things (craftsmen). Hence quantity surveying belongs to the field of the *geometria practica* – the distinction between 'geometria theorica et practica' goes back to Hugues de Saint-Victor and his *Practica geometriae* (c. 1125-1130, Baron 1955, p. 301). In his *Preuve der landt-meters* Martinus Van Dijcke (1714) established a scheme of the field of "geometrics or land surveying" **(fig. 3)**. He distinguished a theoretical and a practical branch. The dimensions of the studied object define the subdivision of the latter in lines (*longimetria*, *altimetria*, *profundimetria*), surfaces (*gaeodosia*, *ichnographia*) and volumes or *stereometria*; this is the art/science of finding the volume of a number of solids (cones, pillars with circular base, pyramids, and truncated pyramids) as well as their application to the measuring of structures and buildings.

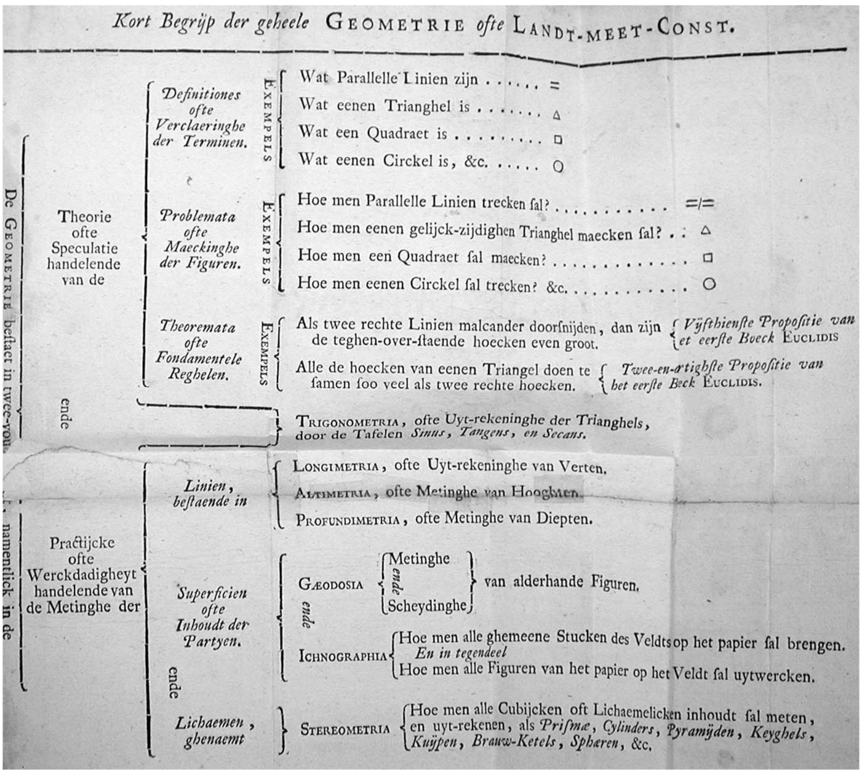


Figure 3. Scheme of the field of "geometry or land surveying" or "Kort Begrijp der geheele GEOMETRIE ofte LANDT-MEET-CONST" (Van Dijcke 1714, private collection).

Stereometria, also treated in Arab mathematics (Dold-Samplonius 1993), formed an integral branch of geometry, with applications to gauging and construction, which could not lack in any manual (cf. Marolois and Girard 1629, pp. 59-61; Tacquet 1669, pp. 107-132 **(fig. 4)**; SBA Cod. 238, ff. 51r-58r and 121r-160v; Thysbaert 1777, pp. 117-34 and 214-30).

Two manuscripts on architecture written around 1600 in the Low Countries contain important sections on ‘stereometry’, and their application to buildings. The 1599 *Architectura* of Charles De Beste, a stone mason of Bruges, contains some more general, theoretical chapters on the measuring of solids, columns, stone basins, pyramids, rhomboids, spheres, platonic solids, and on gauging (KBR Ms II 7617, f.48v°-60v°) **(fig. 5)**, taken out of the third part, *Della misura de’ corpi solidi* of the second book on geometry of the *Opere di Orontio Fineo del Delfinato. Diuise in cinque Partis Arimetica, Geometria, Cosmografia, & Orinoli* (Orontio Fineo del Delfinato, Bartoli and Bottrigaro 1587, ff. 72-85) **(fig. 6)**.

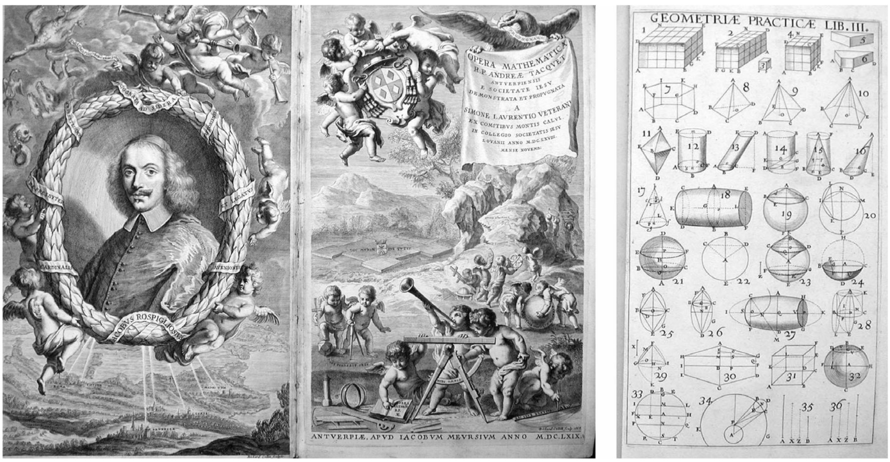


Figure 4. Frontispiece and illustration of the “Geometriae praticae Liber III De corpore” of André Tacquet’s *Opera mathematicorum* (1669, private collection).

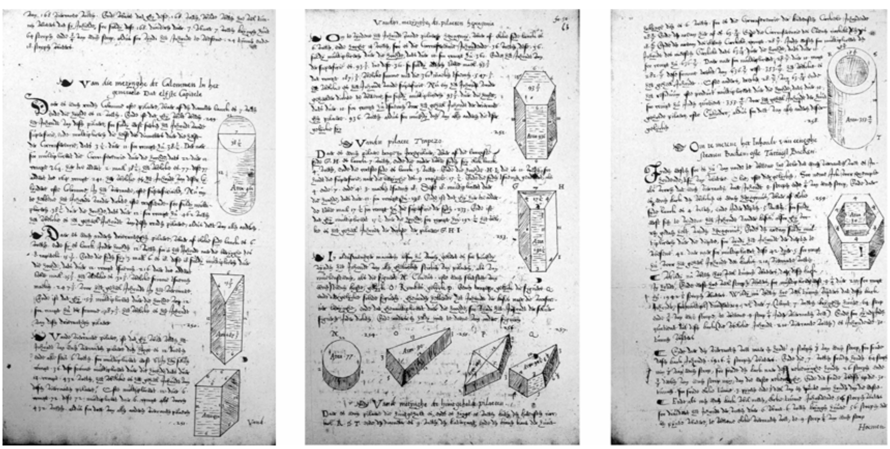


Figure 5. Pages from the chapter on measuring closed solids (“Van de metynghe der Corporele ghesloten figueren. Dat thienste Capitele”) in Charles De Beste’s *Architectura* of 1599 (KBR II 7617, ff. 49v-50v)

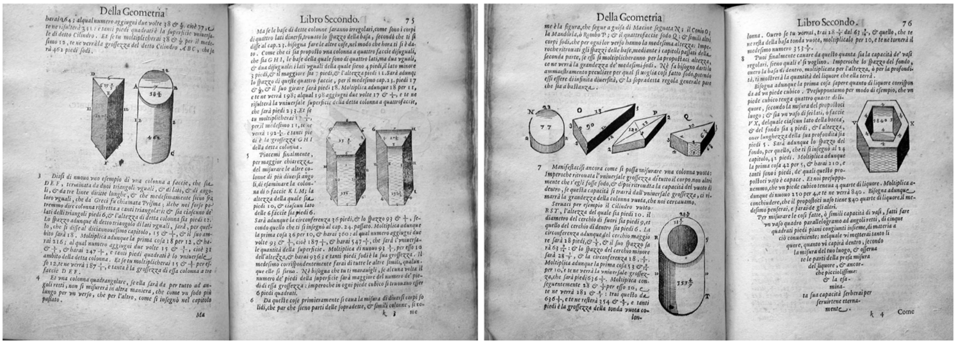


Figure 6. *Della misura de' corpi solidi* or the third part of the second book on geometry of the *Opere di Orontio Fineo del Delfinato. Diuise in cinque Partis Arimetica, Geometria, Cosmografia, & Orinoli* (Orontio Fineo del Delfinato, Bartoli and Bottrigaro 1587, ff. 74v-76r, private collection)

The 1605 manuscript on practical geometrics and fortification by Cornille de Coeulre, a military engineer at Saint-Omer, offers a much more elaborated and more original chapter on *stereometri* (UG Ms 2244, ff. 367-456). It includes how to measure the volume of columns, masonry, fortifications (bridges, vaults, earth work) and carpentry **(figs.1 and 7)**.

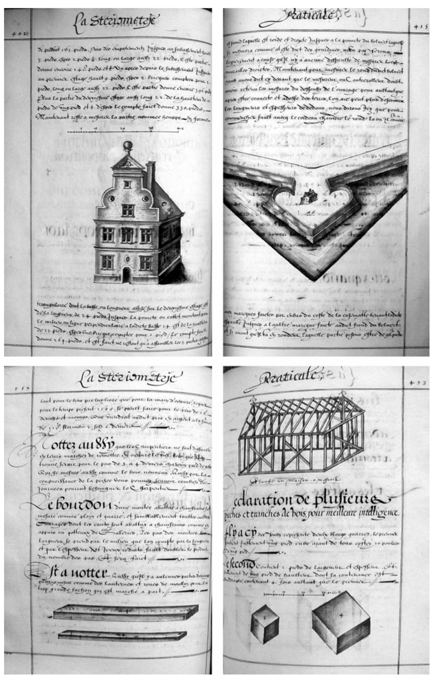


Figure 7. The art of measuring masonry, military works and carpentry by the military engineer of Saint-Omer, Cornille de Coeulre (UG Ms 2244, ff. 402, 415, 452 and 453)

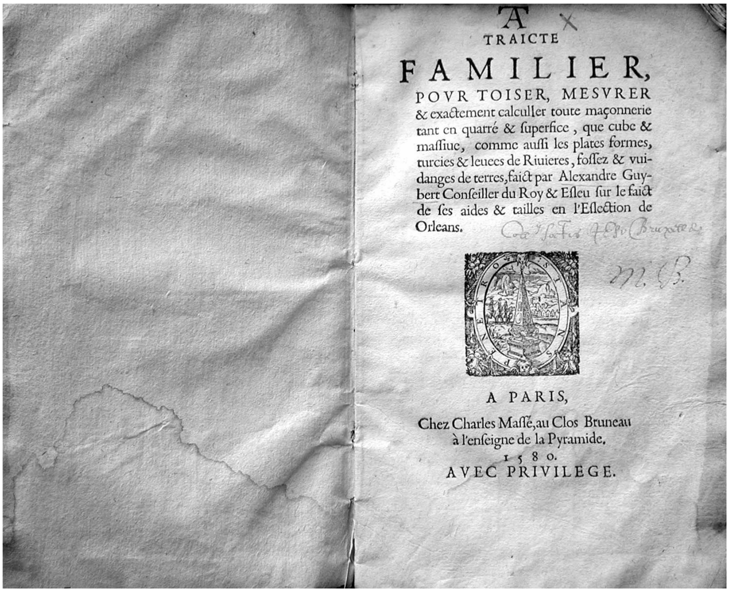


Figure 8. Title page of the copy belonging to the Brussel's Jesuit college of Brussels of Guibert's *Traicte familier pour toiser, mesurer & exactement calculler toute maçonnerie* (1580, private collection)

At the same time, foreign manuals on the subject seem to have circulated in the Low Countries. The Brussels Jesuit college possessed a French *Traicte familier pour toiser, mesurer & exactement calculler toute maçonnerie* … by Alexandre Guibert (1580) **(fig. 8)**.

THE CODIFICATION OF *EDIFICIE METING* IN THE OLD REGIME

Brabant

In order to overcome the daily difficulties, disorder and legal pursuits in court, due to absence of regulation on building measuring, nine sworn land and quantity surveyors of the city of Brussels (J. Laboreur, G. Van Waeyenbergh, G. De Bruyn, Tant, V. Van der Linden, Meckaert, G.V. Eynde, De Mesmaker and M. De Sagher) presented, 19 January 1702, a measuring code to the *Chambre des Comptes* of Brabant. This code, which was said to be hanging from the year 1574, was the work of experts, engineers, surveyors and measurers. It was examined by the commissioner of the mentioned Chamber and by "the most famous architects, experts and surveyors in Brabant" (actual provinces of Flemish and Walloon Brabant and Antwerp). They found unanimously that the value and prizing of materials, the salary of labour and all other aspects were conforming to "the reason, practice and style of the present era". 20 January 1702, the royal professor in mathematics at the Old Leuven University, Martin Van Velden, declared the document "equitable, good, conform to law and profitable to all". 16 January 1705, Philip V announced it as an ordinance for the territory of the duchy of Brabant, entitled: *Instructie ofte Reglement near 't welck alle gesworen Landt ende*

Edificie-meters deser Provincie ende Hertoghdomme van Brabant hun sullen hebben te reguleren in 't feyt van metinge (*Instructie* 1705; Mosselmans and Schonaerts 1976, pp. 86-7; ARA I 112 2026.13). It can be considered to be the first governmental technical building regulation of such extent and detail in Belgium.

The official measuring code treated masonry structures (foundations, walls, windows, porches and other openings, galleries, vaults, chimneys, façades, staircases, towers, pits, ovens, paving, sewing, etc.), stone work in white and blue cut stone, carpentry, roofs in tiles and slates, plastering, windows and glazing, and paved roads. The general objective was to measure exact quantities, but technical difficulties and loss of material were translated in additional quantities.

The ordinance of 1705 also redefined the official recognition procedure for sworn land and quantity surveyors, dating from 1618. In order to obtain the title (patent) of *gesworen Landt ende Edificie-meter* or "mesureurs de terres et d'édifice", one had to succeed in both a test on land surveying and on quantity surveying, conducted by three sworn land and quantity surveyors of the city of Brussels (cf. Mosselmans and Schonaerts 1976, pp. 95-7). The latter test was clearly the most difficult one, and succeeding was not obvious; many only acquired the title of sworn land surveyor (Mosselmans and Schonaerts 1976, p. 90). The difference between the two tests is clearly explained by the sworn land and quantity surveyor J.P. Mahieux in his examination of Luc Anthonius:

> […] sur les sciences nécessaires à un mesureur juré d'édifices. Ces sortes de mesurages exigent absolument de posséder la géométrie composée, sans laquelle il n'est pas possible de pouvoir mesurer les différents solides qui se présentent dans les édifices. Tandis que pour arpenter ou mesurer une pièce de terre, il suffit de sçavoir la planimétrie, et d'avoir un peu de pratique ; d'où résulte qu'un individu peut très bien être en état d'être admis à l'état d'arpenteur, qu'il seroit très éloigné de l'être à celui de mesureur d'édifice. (The measuring [of buildings] absolutely requires the knowledge of composed geometry, without it is impossible to measure the different solids of buildings. For the measuring of land, on the contrary, it suffices to know the "planimétrie" and to have a bit of practice. Hence, an individual could very well be accepted as a land surveyor, and not at all as a quantity surveyor)
>
> (ARA T 460 1292.A.2, Letter of 3 May 1794).

After the test, the future land and quantity surveyor swore an oath to uphold in official function all the stipulations of the *Instructie*. The ordinance also specified the position of the sworn quantity surveyor in the building process: his bill was paid half by the contractor and half by the patron.

Flanders

The practice of measuring buildings in the other parts of the Austrian Netherlands is much less documented. However, the surveying manual of Martinus Van Dijcke, a surveyor from Moerbeke in the land of Aalst in Flanders, regarded the measuring code of 1705 as crucial knowledge for each land and quantity surveyor. He even cited the text *in extenso,* without mentioning that the fact that one was not legally obliged to follow the code in Flanders yet (Van Dijcke 1714, pp. 125-60). 15 May 1754, the ordinance of Maria Theresia on the sworn land and quantity surveyors in Flanders would change this. It imposed the Brabant measuring code of 1705 also to Flanders (*Instructie* 1754; ARA T 460 1292.A.1; Mosselmans and Schoonaerts 1976, pp. XLII-XLIII and 53). However, in 1776, the city of Ghent declared to the central financial administration of the *Jointe des administrations et affaires the subsides* that it only measured exact quantities - and in doing so stated not to apply the 1754 ordinance (ARA I 100 770).

Military works in the Austrian Netherlands

For military works, the military engineers and "contrôleurs" followed their own measuring methods, and they executed those measurements themselves. The 1736 ordinance on the organization of the service of fortification in the Austrian Netherlands freed them explicitly from the local stipulations regarding the measuring buildings.

> Les ingénieurs et contrôleurs se conformeront, à l'égard du toisé, à l'usage pratiqué dans les travaux de nos fortifications, sans qu'ils puissent suivre les lois et coutumes des villes dans ledit toisé, soit de maçonnerie, charpente, couverture des toits et autres, et ne passeront en compte, dans le relivrement, que la quantité effective qui sera trouvée dans la solidité, longueur, largeur et hauteur, sans mesurer le vide des voûtes, portes et fenêtres.
>
> (Gachard 1882, pp. 121-125, art. 23).

A manuscript treatise on the measuring of masonry, carpentry, ground work and roofs out of the context of the military engineers of the Austrian Netherlands, gave attention to calculation in local measurements and to the measuring of masonry, carpentry and roofing, and added a price list of materials in different places (in 1742 and 1745). In its account of the calculation of a cubic "toisé" of masonry, it paid attention to the origin of the lime, which had implications on the composition of the mortar, and therefore on the building costs (UG Ms 1071, pp. 145-65)

The Prince-bishopric of Liège

In the independent Prince-bishopric of Liège, the situation was different. This country had also the particularity that the measuring unit for land, the foot of St. Lambert, differed from the one to measure buildings, the foot of St Hubert. In the city of Liège, the masons appointed their own quantity surveyors, as was stated in the regulation of the corporation of the masons of 19 June 1632.

> 19. Et afin d'éviter beaucoup d'abus, fraudes, plaintes ou discommodités desdits marchands et autres qui sont commis ou soi pourroient commettre au futur, et avoir tant plus meilleure règle et police endit mestier, signamment entre ceux qui auroient marchandé ouvrages et bastimens à verge et mesure, avons ordonné et trouvé

convenablement qu'on pourra dénommer et élire par suite et terme un ou deux maistres-ouvriers de nostredit mestier sermentés aux seigneurs bourguemaistres de cette cité et mestier, pour faire ladite mesure de toutes tellesdites marchandises, afin savoir le nombre et somme dudit ouvrage; et ne pourra personne dudit mestier, autre que lesdits maistres sermentés, mesurer ni prendre connoissance d'icelles; autrement que, faisant au contraire, tomberont en l'amende, pour la première fois de trois florins d'or, pour la deuxième de six semblables, et pour la troisième d'estre privés du mestier

20. Item, que teldit maistre mesureur ainsi sermenté, aura et pourra demander pour ses vacations, peines et mesurages, pour chascune verge en, la cité, franchise et banlieu, quatre patars de Brabant, à payer par moitié par les deux contrahans, à savoir deux à chascun au profit dudit mestier.

(Polain and Bormans 1872, pp. 109-12)

Also in this region, order was imposed upon the surveying profession at the beginning of the eighteenth century. The ordinance of 3 July 1704 by Joseph Clement de Bavière, installed the sworn surveyor (Mosselmans and Schonaerts 1976, p. XLV).

The surveying treatise by Martin Malte contained a measuring code for building works (wood, stones, masonry, paving of roads) after the costume of Liège (1716). The latter costume referred to quantity surveying as “mesurer la solidité”. Note that the printing privilege for this treatise dates from 14 November 1716, while the manuscript was already examined twice in 1699 and approved on 7 September 1703 (Mosselmans and Schonaerts 1976, pp. 42-3). In 1744, the master arithmetician and sworn surveyor of the city of Liège, Jean Harroy, proposed a new measuring code for masonry in cut stones (“nouveau règlement pour la mesure des pierres de taille”). The aldermen of the city of Liège and the corporations of the masons and stonecutters (“recès des gouverneurs du bon métier des maçons et des maîtres tailleurs de pierres”) welcomed it as “parfaitement exacte et beaucoup meilleure que celle qu’on a ci-devant suivie” (perfectly exact and much better than the existing code) (Mosselmans and Schonaerts 1976, pp. 45-6). The new regulation was approved by the prince-bishop Jean Théodore (Conseil Privé, 20 November 1744). In the sixth chapter of his book, first edited in 1745 by J.G.M. Loxhay (later editions: 1756, 1776, 1780, 1795), Harroy gives in length, in great detail and with a lot of illustrations **(fig. 9)**, the “Réglement pour la mesure des pierres de taille”, the “Réglement pour la mesure de la Maçonnerie” and the “Réglement pour la mesure des toits d’ardoises” (1795, pp. 132-71, 171-7).

The local mathematician and surveyor of the States of the Land of Liège, Alexandre Carront, corrected in his *Du devis des bâtimens* some errors made by Harroy (1752). Also the passages on the measuring of masonry, roofs and paving in the surveying manuscript by J.-G. Buntinx, dating from 1756-62 was largely inspired by Harroy (Buntinx and Van Laere 1984, pp. XII, 107-08, 119-25).

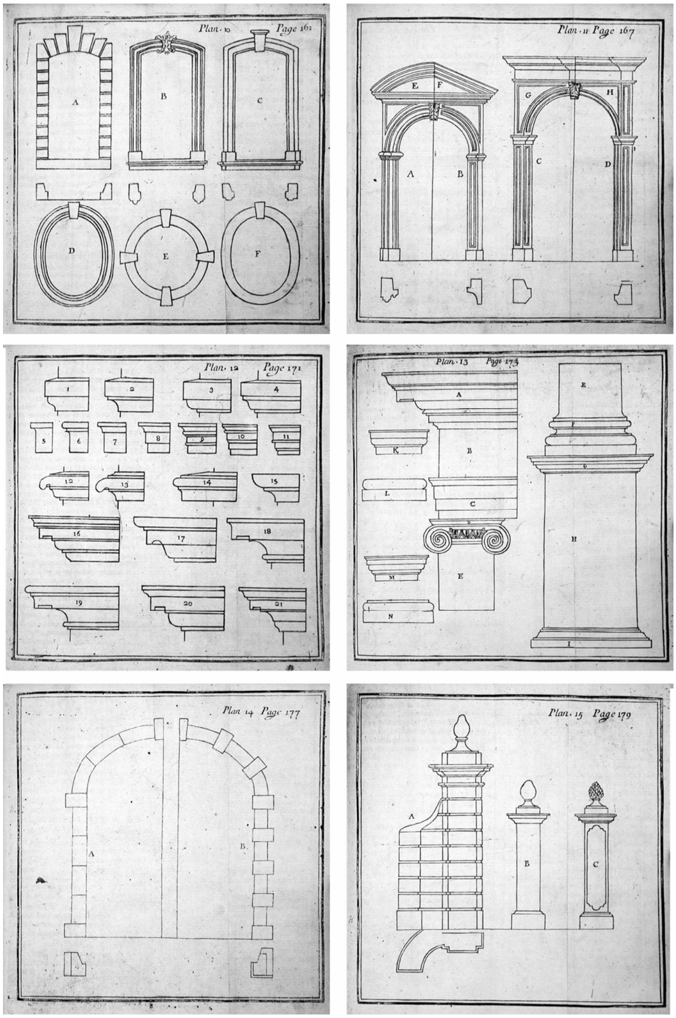


Figure 9. Illustrations to enhance the understanding of the measuring code of the prince-bishopric of Liège regarding the survey of façades, porches, windows, cornices, columns and garden gates (Harroy 1795, private collection)

THE CODIFICATION BY THE BRUSSELS SOCIETY OF SURVEYORS IN THE NEW REGIME

In the New Regime, the old privileges of the land and quantity surveyors were abolished. A new system of measures, the metrical system, was introduced immediately in the occupied regions by the French troopes and confirmed definitely in 1816. The new organization and regulation of the profession of the "géomètre juré" ("géomètre du cadastre", "géomètre de première classe", "ingénieur géomètre", 1825 and following) did not attribute them anymore a privileged position in the art of measuring buildings.

Meanwhile, the rise of professional building administrations (such as the Conseil des Bâtiments civils, the Corps des Ponts et Chaussées and the Corps of Waterstaat and Public Works), and the related rapid emancipation of the professional categories involved (architects, engineers and contractors, cf. Van de Vijver 2003), caused the calculus of quantities to became an inherent part of the decision making process and modern market orientated building economy. Quantity surveying was no longer dominated by the sworn land and quantity surveyors. In the beginning of the nineteenth century, the French Conseil des Bâtiments Civils observed still the local traditional way of writing building specifications, which they did not understand (it was a sort of "relevé parlé" of the way one measured buildings, see for instance AN F 13 1634, notably the files of 1811 on a porch and bridge in Mechelen, and of 1813 on the "bureau de l'octroi" in Lier). This French administration (and its successor the Corps of Waterstaat and Public Works, which was directed by French educated professionals) imposed the French system, which measured the quantities exactly, without correcting those figures for loss of material or difficulties of execution. This new method implied very detailed lists of prices.

With the new professional organization of surveyors, in 1876 was founded the *Union des Géomètres-Experts de Bruxelles* (UGEB), and surveyors tried to impose themselves again in the field of quantity surveying. Aware of the numerous conflicting methods to measure buildings, they took action to change this situation. They investigated the legal precedents. In absence of new legislation, costume continued to uphold (cf. Code civil art. 1135, 1159, 1160, De Schrijver 1951, p. 9-10). Hence, their research for Brabant led them to the already mentioned ordinance of 1705 and, for Flanders, to the one (with the same content) of 1754. In 1878, this Brussels based organization agreed upon a new *Code de mesurage des bâtiments* (reevaluated in 1931 and 1960) **(fig. 10)**. The 1931 code, adopted by the UGEB on 24 June and 24 September 1931, was a revision directed by six specialised commissions (UGEB 1931, p. 6). The 1960 code was compiled by the members of the different commissions of the UGEB in close collaboration with the *Confédération Nationale de la Construction* (CNC), which grouped the *Fédérations nationals du Bâtiment et des Travaux publics*, and, for the professions which did not take part in the CNC (electricity, ironwork, and isolation), by the *Union Patronales Nationales* of those professions. Hence, the code of 1960 was intended as a 'national' document, which aimed both to become the code for the official administrations and for the private sector (UGEB 1960, p. 3-4). However, the regional differentiation of measuring codes still remained part of the daily practice: the measuring code for buildings for the Liège region, edited in 1963, for instance, stressed these regional differences in the introduction to the code, although the code itself was largely based upon the UGEB code (ARAL et al. 1963).

In the mentioned UGEB codes, the principle remained that of the 1705 and 1754 measuring codes: to measure the structures as exactly as possible, but to compensate for supplementary difficulties of execution and for loss of materials by adding (none really existing) quantities or by applying coefficients to those quantities ("Le principe directeur de la mesure effective a été maintenue comme par le passé. Il s'est cependant avéré que dans certains cas, il était indispensable de compenser soit des difficultés supplémentaires d'exécution, soit des pertes de matières. Ces compensations ont fait l'objet d'examens approfondis avec la préoccupation de les limiter au strict minimum, de rester objectif et soucieux de l'intérêt du maître de l'ouvrage", UGEB 1960, p. 3). Note also the traditionalist and legalistic approach by the surveyors union ("Met dergelijke principen, worden duurzame wetten gesmeed omdat zij stroken met de opvattingen der plaatselijke ambachtslieden en aannemers; zij bevestigen het gewoonterecht, en passen het aan de ontwikkeling der bouwnijverheid", De Schrijver 1951, pp. 6-8).

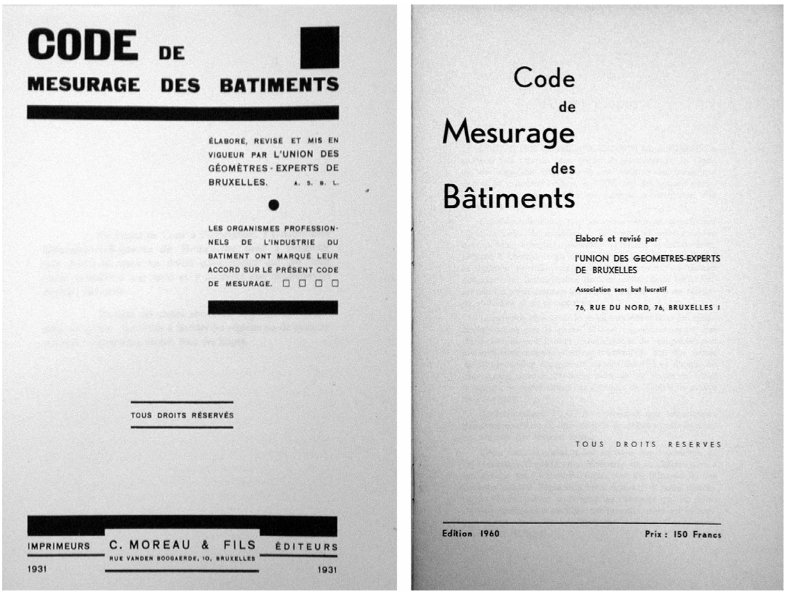
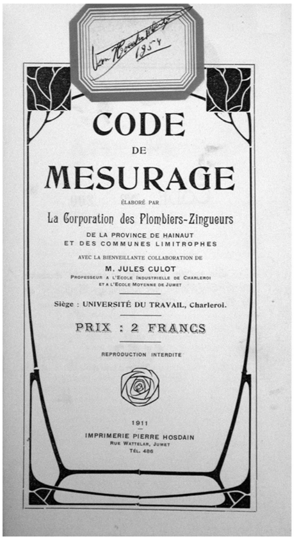


Figure 10. Measuring codes for buildings (UGEB 1931; UGEB 1960, private collection)

In Flanders, the *Syndikale Kamer voor Aannemers der Provincie Oost-Vlaanderen* (Syndical Chamber of Contractors of the Province of Eastern-Flanders) investigated and updated the 1754 ordinance in 1916. In the beginning, the use of this measuring method was specified in the building contract, but later it became generally accepted. In 1928, the *Verenigde Landmeters van Oost-Vlaanderen* (United Surveyors of Eastern-Flanders) agreed upon the use of the mentioned measuring code proposed by the Syndical Chamber (De Schrijver 1951, p. 11).

The rapidly evolving building industry, characterized by the introduction of new materials and techniques and new ways of living (cf. apartments buildings, UGEB 1961), imposed a new rhythm to the codification process. New sectors of the building industry (such as the use of zinc) imposed the development of new and transparent rules to ensure fair trade and commerce. The *Corporation des plombiers-zingueurs de la Province de Hainaut et des Communes limitrophes* established, for instance, a measuring code for works in zinc **(fig. 11)**, obligatory for all its members (CPZPH 1911).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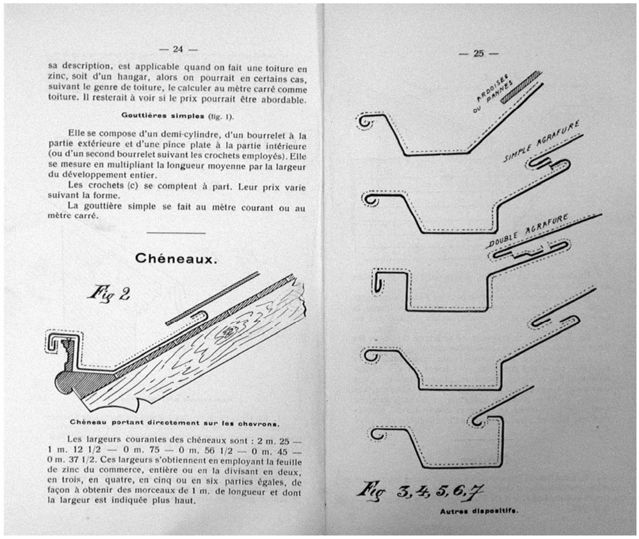
DE
MESURAGE
ÉLABORÉ PAR
La Corporation des Plombiers-Zingueurs
DE LA PROVINCE DE HAINAUT
ET DES COMMUNES LIMITROPHES
AVEC LA BIENVEILLANTE COLLABORATION DE
M. JULES CULOT
PROFESSEUR A L'ECOLE INDUSTRIELLE DE CHARLEROI
ET A L'ECOLE MOYENNE DE JUMET
Siège : UNIVERSITÉ DU TRAVAIL, Charleroi.
PRIX : 2 FRANCS
REPRODUCTION INTERDITE
1911
IMPRIMERIE PIERRE HOSDAIN
RUE WATTELAR, JUMET
TÉL. 486


— 24 —

sa description, est applicable quand on fait une toiture en zinc, soit d'un hangar, alors on pourrait en certains cas, suivant le genre de toiture, le calculer au mètre carré comme toiture. Il resterait à voir si le prix pourrait être abordable.

Gouttières simples (fig. 1).

Elle se compose d'un demi-cylindre, d'un bourrelet à la partie extérieure et d'une pince plate à la partie intérieure (ou d'un second bourrelet suivant les crochets employés). Elle se mesure en multipliant la longueur moyenne par la largeur du développement entier.

Les crochets (c) se comptent à part. Leur prix varie suivant la forme.

La gouttière simple se fait au mètre courant ou au mètre carré.

Chéneaux.

Fig 2

Chéneau portant directement sur les chevrons.

Les largeurs courantes des chéneaux sont : 2 m. 25 — 1 m. 12 1/2 — 0 m. 75 — 0 m. 56 1/2 — 0 m. 45 — 0 m. 37 1/2. Ces largeurs s'obtiennent en employant la feuille de zinc du commerce, entière ou en la divisant en deux, en trois, en quatre, en cinq ou en six parties égales, de façon à obtenir des morceaux de 1 m. de longueur et dont la largeur est indiquée plus haut.

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Fig 3, 4, 5, 6, 7

Autres dispositifs.

Figure 11. Illustrations to enhance the understanding of the measuring code of the corporation of plumbers and zinc workers of the province of Hainaut (CPZPH 1911, private collection)

Originally, the measuring code for reinforced concrete was a chapter of the general measuring code for buildings, composed by the UGEB, but it was printed in a separate brochure, entitled *Code de mesurage du béton armé* (UGEB 1931, p. 6). The fourth chapter of the measuring code for buildings of 8 July 1913 already treated such structures. It was compiled by the UGEB in collaboration with the *Association des Entrepreneurs de Maçonnerie et de Béton Armé* and the *Chambre Syndicale de la Maçonnerie* (UGEB 1948, p. 78). Very quickly, the evolution in the use of reinforced concrete imposed a revision of this chapter. The syndicate addressed the national building industry and the architects' and contractors' associations. A commission delivered the code of 1929, adopted by the UGEB on 22 December 1927 (UGEB 1948, p. 6).

The measuring code of reinforced concrete of 30 April 1948 fundamentally broke with the traditional measuring method, which included adding coefficients to quantities in order to compensate, in certain cases, the supplementary costs of labour and the loss of wood applied for shuttering. In 1948 the following principle was adopted: the quantities would be measured exactly ("à de très rares exceptions près"), the difficulties of execution were taken into account in the second part: the "règlement des comptes". This last part could be treated in two ways, regarding the wishes or desires of the two parties (contractor and patron) involved. One could opt for a "prix moyen” or for a “prix de base”, the latter could be altered by “coefficients de majoration ou de diminution” (UGEB 1948, p. 8) **(fig. 12)**. This new way of measuring became generally accepted and was reprinted in 1954. At that moment, some additions were made regarding the new method of prestressed concrete (UGEB 1954, p. 8).

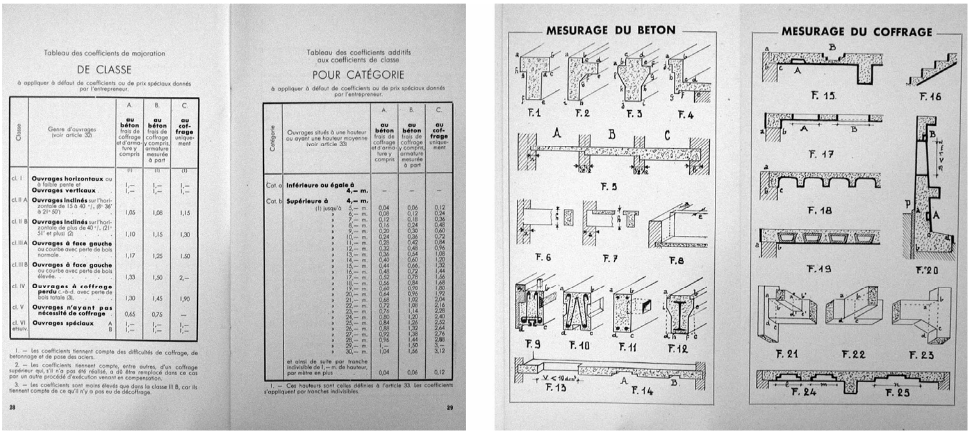

Figure 12. Illustrations and tables of price coefficients to enhance the understanding and the practical use of the measuring code for reinforced concrete (UGEB 1948, private collection)

CONCLUSION

Although the art of measuring buildings in the Low Countries can be traced back to the Middle Ages, the codification process dates from more recent times. Both in the Austrian Netherlands and in the Prince-bishopric of Liège, the sworn land and quantity surveyors succeeded in getting official approval for standard measuring codes, which obtained a legal status. This differed from situations in other countries, such as France, where the *coutume de Paris* remained in essence oral (the written versions were not official and did not have the same status as the Belgian texts, (Ozanam and Audierne 1779, p. 329-496; Le Gendre 1809), the Northern Netherlands (Morgenster and Knoop 1784), or the German speaking realm (Penther 1752, *Zugabe* pp. 23-7). In part, the sworn land and quantity surveyor derived from these codes their crucial role in the construction world of the Old Regime.

In the New Regime, the quantity surveyor lost this position to architects, contractors, engineers and building administrations. This swift change in status of the surveyor had a clear influence on the codification process. Their codes did not end up any more in the corpus of legislation. As a normal actor in civil society, the organizations of surveyors tried to maximize the spread of their code(s) by collaborating with the building industry and by relying on tradition and costume (the eighteenth century ordinances). The latter explains in part the late introduction in the codes of novel techniques in quantity surveying.

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