HISTORY AND DEVELOPMENT OF CMU MARKET IN BRAZIL FOR THE LAST 40 YEARS

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In Brazil, structural masonry with concrete blocks began in the 1960s. During the 1970s has occurred a big prosperity of this building system development. At the time, housing constructions developed and many industries were built. High production machineries were imported and the national industry for block production equipment began to develop. The technical development also occurs rapidly. Emerge the initial structural masonry design (calculation) offices. The initial symposiums and conferences take place and allow quickly technological development. The 1980s decade had a big stagnation and the construction barely increased. From 2006 the Brazilian construction sector enters a period of high growth. Credit offer and governmental programs promote middle and low classes focused constructions, were there’s a large housing deficit. Concrete blocks structural masonry returns to be large used and the block demand grows every year. In this perspective, this paper aim to do a brief historical review about the Structural Masonry Building System in Brazil, since its initial years till today. Through extensive literature research and mainly through interviews, with big names who participated (and are participating till today) of this development, information were collected for this work. The paper focus, on chronological way, this evolution aspects contemplating: technological development, companies, professionals and technical publications. The article shows that the structural masonry development in Brazil was achieved with some professionals great effort and determination. Besides, in a high demand moment (since 2006), the technological development allowed this Building System consolidation as a viable alternative and highly competitive.

Keywords: CMU manufacturer, innovation, masonry, structural masonry history

INTRODUCTION
In Brazil, the structural masonry is used since XVII century beginning. However, the structural masonry with loadbearing blocks, seen as a constructive process focused on the achievement of more economical and rational buildings, took a long time to find its place (RAMALHO, CORRÊA, 2003).

Concrete blocks began to be used around 1940, with the building of a housing development in Rio de Janeiro. In early 1950s an engineer used a reinforced masonry system to build a 4 storey building in Praia Grande city (Magazine A Construção São Paulo, 1977b).
The early structural masonry technical and scientific development coincides with the country economical cycles. Beginning in the 1970s decade, period known as the economic miracle, the structural masonry is introduced in Brazil, big industries were set up and large realty enterprises were built. In the 1980s, the country enters into a crisis and low growth time, inflation reaches extremely high levels and the construction sector enters a recessive period, of few achievements. In the 1990s, the country enter a recovery that it’s only perceived by the construction from 1995, when economical stability promote new achievements. In the 2000s, from 2006, the country enters a new virtuous cycle, with extensive credit for realty enterprises. Take place big housing developments recovery, especially for the middle and low classes, where the building typology points to the structural masonry use. Figure 1 shows the cement consumption (millions of tons) from 1970 to 2009. In Brazil a parallel can be done between de cement consumption and the civil construction activities.

![Figure 1: Brazil’s cement consumption 1970-2009 (CARVALHO, 2010)](#)

In this panorama, this paper briefly shows the concrete blocks structural masonry development and implementation as building system in Brazil, especially in São Paulo metropolitan area in the last 40 years, highlighting some organizations, constructions companies, industries and people that helped to make this construction system history. It`s worth remembering that many professionals contributed to the structural masonry development and establishment, and since now the authors apologize for any names that may not have been cited.

**THE 1960s AND 1970s**

The concrete block large scale industrial production begins in the 1960s. With Jupiá and Ilha Solteira hydroelectric power plants construction it became necessary the construction of large building sites to host the employees. Concrete blocks were also used to rebuild homes for the population affected by the floodings. Camargo Corrêa Construction Company, responsible for the plants building, buys a few Besser machines and starts the concrete blocks production. Apparently this was the company that brought the initial machines blocks to Brazil.

After the works all equipment was transferred to São Paulo and it`s established the Reago (a Camargo Corrêa company), that start to produce and attend the growing product demand,
used mainly to build social housing financed by BNH – Housing National Bank (GRANDI, 2002; SOUKEF JUNIOR, 2004).

In 1966, at São Paulo city, driven by the credit demand provided by BNH, the Regional São Paulo Construction Company, under Eng. Eugenio de Andrade Martins management imported an American Besser Machine to construct the initial concrete blocks structural masonry buildings: the Central Park Lapa real estate development, composed initially of 4 storey residential buildings.

![Figure 2: a) “Projeto Caracol” Building (Construção São Paulo Magazine, 1977b) and b) Central Park Lapa (Prisma Magazine, 2002)](image)

Year 1970 marks the beginning of the period named “Brazilian economic miracle”. Foreign loans and investments boosts the development process, the GNP increase in 1970 was 10,4%, reaching 14% in 1974. In 1972 was hold the First National Building Gatering – ENCO, chaired by Sr. Jan Arpad Mihalik, chairman at the time of the Engineer Institute (Instituto de Engenharia, 2011). In this conference, Eng. Cid Luiz Racca presents the first reinforced masonry calculus guide, translated and adapted from American guides.

Around 1972, Zarvos Construction Company develops a project named Projeto Caracol (“Curl Form” Project – Figure 2a). Based on 4 storey buildings, with split-face blocks under the windows, it was projected to be constructed in 20m x 50m (1.000m²) areas. The project was a success and in three years more than 35 were built in approximately 20 different neighborhoods in São Paulo city.

In 1974 was built the initials tall buildings block (condominium) with loadbearing concrete blocks. Projected by Architecht Fuad Jorge Cury, calculated by engineer José Luis Pereira and built by the engineer Carlos Augusto Grandi, was advised (as consultant) by the North American engineer Green Ferver, contain 4 towers of 13 stories (Figure 2b). All buildings are fully occupied till nowadays.
The 1975 mark was the construction of the tallest structural masonry building till then. The Muriti Building, with 16 stories built by Guaratinguetá Construction Company in São José dos Campos city (100 Km from São Paulo). In 1976, Balbo Construction Company built a 12 buildings housing, 12 stories each one, in Diadema city (São Paulo Metropolitan Area).

As noted, the 1970s brought great prosperity for the construction and for structural masonry development in São Paulo. At this time concrete blocks industries grown: initially Reago, followed by Concretex and subsequently by Concremix. These three industries together owned 8 high-capacity machines and were producing almost the total of concrete blocks used in that decade (Figure 3).

![Figure 3: Timeline – Main São Paulo manufactures in the 1970s.](image)

Another important mark in the 70s was the large Cohab (São Paulo Housing Company) social housing construction. Reago, to measure construction speedy and low costs benefits, hired engineer Jorge Kurken Kurkdjian and developed (without costs for COHAB) a structural masonry project for the buildings construction.

In 1976, Cohab chairman, Joaquim Correa Moraes Abreu Filho, launched the first housing bidding for this plan: 37 buildings with 5 stories each (around 1.800 apartments) in Itaquera district, built in a 12 months schedule (Construção São Paulo Magazine, 1977a).

Beter Construction Company won the bid. The experience with structural masonry building system was very positive. Following the success only in Itaquera social housing were constructed more 55.000 apartments in structural masonry. Figure 4 shows an outlook of this social housing at the time.

Late 1970s, concrete block use (and its apparently advantages) was consolidating in nonloadbearing and loadbearing walls. New several industries were created based on low capacity machines and the technical body began to organize to develop and regulate concrete blocks applications. Engineer Cid Luiz Racca says in an interview: “The growing development of structural masonry building system is demanding new concrete blocks industries” (A Construção São Paulo Magazine, 1978).
The initial Brazilian blocks machines began to come into operation. As named for example, the P. Glasser Company, which acquires in 1972 a Montana/Trillor machine with 80.000 blocks/month capacity, and in 1976 expands its installations acquiring a Columbia machine tripling its productive capacity (IURKY, 2008).

Just as P. Glasser, others companies began concrete blocks production with national and imported machines. In July 1977, promoted by the Engineer Institute (Instituto de Engenharia) occurs the first Structural Masonry Seminar, with about 150 professionals representing more than 50 engineer and construction companies, public agencies and private sector agencies as ABCP (Portland Cement Brazilian Association) and IAB (Brazilian Architectures Institute). At that time the first commission for elaboration of the Brazilian standard for concrete block structural masonry was officially installed.

Started a few years before in December 1978 were presented the initial efforts results. The main results were the papers presented at a colloquium sponsored by Ibracon (Brazilian Concrete Institute). Within the publications, the highlighted paper’s authors are: Architect Carlos Alberto Tauil e Cid L. Racca (Reago – Block Manufacturer); Eng. Carlos Eduardo de Siqueira Tango (IPT – Technological Research Institute); Eng. Paulo Roberto do Lago Helene (USP – Sao Paulo University); Eng. Alberto Calegari Nunes (Concremix – Block Manufacturer); Eng. Jorge K. Jurkdjian; Architect Fuad Jorge Cury. At the colloquium, also was presented a preliminary version of the Brazilian standards, published in 1982. Also highlight Eng. Nelson dos Santos Gomes work that performed a large number of wall tests.

**THE 1980s**

The 1980s began with great activity but the crisis experienced by Brazil from 1982 grossly slows down the constructions. Published in 1981, authorship of Carlos Alberto Tauil e Cid Luiz Racca, “Reinforced Masonry” is the first Brazilian book focused on structural masonry building production. The book was revised and reissued in 2010.

In October 1987 was held the “VI Construction Technological Symposium: The Masonry Use as Structure”, at São Paulo University Polytechnic School. There were presented papers

Also were presented papers focused on masonry resistance capacity (Eng. Jeferson F. Camacho, Eng. Luiz Sérgio Franco, Eng. Luiz Roberto Prudêncio Junior). An important work “International Standard and State of the Art Masonry Structures Dimensioning” was presented by Eng. Nelson dos Santos Gomes. Also were presented papers focusing ceramic blocks and sand-lime bricks as structural elements (Eng. J. L. Campagnolo, Eng. Luiz Sérgio Franco, Eng. Vitor Levy C. Aly). Figure 5 illustrates some publications from the period.

![Figure 5: Some 80’s Brazilian Structural Masonry publications examples](image)

At another dissemination group was necessary prepare the future engineers for the new building system use. To this end, builders and block producers approached universities due to some professors enthusiasm, who became part of the dissemination and knowledge management. Besides São Paulo, the Structural Masonry Building System also spread through the country and it’s been studied in many colleges. For example stands out: UFSC (Santa Catarina Federal University) Construction Research Center works, created in 1991 and conducted by professors Luiz Roberto Prudêncio Junior and Humberto Ramos Roman; in USP São Carlos Campus, the works from engineers Márcio Antonio Ramalho and Márcio Roberto S. Corrêa; in UFSCar (São Carlos Federal University) stands out works coordinate by the engineer Guilherme Aris Parsekian; and in UNESP Ilha Solteira Campus (Ilha Solteira Engineer College) works coordinate by Eng. Jefferson Sidney Camacho.

**THE 1990s**

Following the 1980s stagnation trend, the 1990s first half kept the low activity in the construction sector, however the researches with structural masonry continued. In early 1990s the Poli-Encol Project reports get completed (it was initialized in 1988). Result of a collaboration agreement between a large construction company with operations throughout all over Brazil (Encol Construction Company) and USP (São Paulo University), the project was focused on nonreinforced loadbearing (structural) masonry for up to 9 stories with concrete blocks produced on the building site. Studies focused aspects related with the building construction (not only the wall). Project aspects, techniques, technologies, methods and constructive process were developed orientated by the edifice (building). Many renowned
professionals that work till nowadays were “graduated” in this project. Unfortunately Encol stop its activities in 1997 and didn’t go on with the project.

In 1990 ABCI (Industrialized Construction Brazilian Association), gathering several experts contributions, edit the book “Masonry Technical Guide”, focusing several structural masonry system aspects (as rationalization, performance, pathologies, besides calculus aspects). In 1992 Glasser Company buys Concretex Company and achieves the market leadership. It is up to today the most modern manufacturer in Latin America, and own 4 Besser machines (concrete blocks manufacture machines with worldwide recognition). Later Glasser purchases the land and the property in Cumbica district, Guarulhos/SP, in which centralized all administrative, commercial and industrial activities.

Since 1997 Sinprocim (São Paulo State Cement Products Industry Union) gives the “Prêmio Qualidade” (Quality Award) award. As a rewarding way for sector companies that stand out, the award aims to recognize and to promote the cement products manufactures and branches efforts (SOUKEF JUNIOR, 2004). The Qualihab and PBQPh Programs (Brazilian Program for the Habitat Quality and Productiveness) were created in mid 1990’s. Both programs were Federal Government instruments that aim to organize construction sector around the two main questions: habitat quality improvement and production modernization. This goals search involves a set of actions, among which stands out materials quality improvement (Ministério das Cidades, 2011). The Concrete Block Quality Seal (“Selo de Qualidade”) from ABCP (Cement Portland Brazilian Association) was created in 2001 to attend the industry commitment before PBQPh. Today is a market recognized instrument that helps manufactures to achieve quality in their products. As all qualities programs, the seal has a schedule and after the expiring date new auditing and testing need to be done. The seal qualifies but not certifies a product. With it the producer is induced to join a quality program (Portal Prisma, 2011).

THE 2000s UP TODAY
The construction sector overheating up begins in 2006. Credit easiness and availability and governmental housing incentives programs, “C” and “D” classes focused, created high housing demand. Big housing complexes are commercialized and structural masonry reappears as main building system. Figure 6 shows a typical building site in São Paulo Metropolitan Area: a large residential development (condominium), composed by several 20 stories structural masonry buildings.

![Figure 6: Housing Development example in São Paulo 2010](image)
To illustrate the Concrete Block Structural Masonry new expansion driven by the demand, Graphic 1 shows the sales comparison between non-loadbearing and loadbearing blocks from Glasser Company (largest concrete block company in Brazil). It’s clearly shown the concrete block market redirection towards Structural Masonry Building System.

![Graphic 1: Loadbearing x Non-loadbearing Glasser sales (2001 a 2011)](image)

The Brazilian Concrete Blocks Manufactures Association (“ bloque brasil – associação da indústria brasileira de blocos de concretos”) was created in 2004 to promote the masonry and paving concrete block sector, making that all the production chain offer quality building systems.

In 2008 engineers Márcio Antônio Ramalho e Márcio Roberto S. Corrêa launch the book “Structural Masonry Design for Buildings”, important publication that quickly became a Brazilian reference.

After technical debates, in 2011 ABNT publishes the review of the Brazilian Standard for Concrete Block Structural Masonry Project and Building Construction and Quality Control, ABNT NBR 15.961 parts 1 and 2.

**FINAL CONSIDERATIONS**

The paper looked for, briefly, register the structural masonry footsteps in Brazil, especially in São Paulo, place where the large manufactures are installed. Obviously, due to the summarized work format, some company and professionals weren’t mentioned, the authors ask for its apologies. Also it tried out to highlight the initial development (from 1960s to 1990s), as there are limited information available and one of the paper authors actively experienced this building system entire evolution.

**REFERENCES**


CARVALHO, O. J. “O Avanço do consumo aparente de cimento no País nos últimos anos”. Revista Concreto e Construções (Ibracon) n. 59, Jul-Set 2010


