Oriented Strand Board Industry Development in the South American Region - Main Challenges

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Abstract

Unlike North American (N.A.) and European markets, the oriented strand board (OSB) industry is currently in an introductory stage of development in South America (S.A.). Although OSB mills have been operating for more than five years in Chile and more recently in Brazil and Venezuela, the production levels and consumption remain far below those existing in more mature markets. In contrast particleboard and medium density fiberboard (MDF) industries had a very intense and fast development in the past for the same market and even under less favorable conditions. Even other structural wood composites have a more expanded development in the region, i.e. LVL. Although the remarkable structural properties of OSB and potential advantages over other building materials are well known, some factors disallowing a stronger positioning of the product exist. The objective of this research was to analyze the evolution of the OSB industry in the South American region and determine the obstacles and challenges that this industry currently faces. A comparative analysis was carried out between the N.A. and S.A. OSB market evolutions; cultural backgrounds; research and development (R&D) investment and initiatives as well as political and governmental influence. A huge influence of the Hispanic cultural background in the acceptance of wood construction in the market emerges as a major challenge. The market size is also a very important factor, the production-consumption levels in the region are less than 1% of the N.A. equivalent, R&D initiatives in small countries face dramatic budget restrictions; the investment in R&D of OSB in S.A. is less than 0.01% of the current in N.A.. All the necessary knowledge to develop the industry is acquired from more developed regions not necessarily reaching a critical mass to steering the market to a more favorable situation for the OSB industry. Export market for OSB production in S.A. also faces the threat of low consumption levels in N.A. and increasing production in Asia.

Keywords: OSB market, South America, OSB export, OSB development

Introduction

Wafer board or flake board was introduced to the construction industry as early as the second half of the 1950's in the United States and Canada. The next step, oriented strand board (OSB) and its derivative, oriented strand lumber (OSL) are part of a group of products resulting from the former flake board currently known as oriented strand composites (OSC). Since the early 1960's, countless technical and scientific works have been published on the topic ranging from the use of different species to marketing and distribution in N.A. All the various steps involved in the production line have been profusely studied. Although the majority of product development was done by industry, with much of this information kept proprietary. In this region many specialized (Non industrial) institutions devoted considerable of resources to bring further develop and avance these products. A few examples of such institutions are Forintek and the Alberta Research Council in Canada; in the United States APA - the Engineered Wood Association, the Forest Products Laboratory in Madison, WI, along with several universities such as University of Maine, Washington State University, Virginia Tech, Oregon State University among other institutions that lead the research developed for many years on this topic. This combined industrial governmental and educational research effort allowed the OSC products to gain acceptance and grow rapidly in the marketplace. The current downturn in North American markets has created a series of new challenges to the OSC industry that should be taken as opportunities for improvement in several areas on these institutions.

OSC products are primarily engineered to be used in the housing market and in general use buildings as sheathing material with structural function on shear walls and roofing replacing solid wood (Adair, 2004). The American Society of Testing Materials (currently ASTM international) provides a set of standards to determine the mechanical properties of these materials. Building codes like the National Design Specification (published by the American Wood Council) provide design values for the products available in the United States market simplifying the design task for engineers and builders (Turner et al., 2005).

Technical analysis of the advantages in their utilization is beyond the scope of this report, and considerable literature is available from journals such as Forest Products Journal, Wood Science and Wood and Fiber Science along with other scientific sources. It can be said however that the advantages of using OSC as structural panels range from production costs to the utilization of the resource.

In countries with limited availability of forest resources optimization of their utilization is crucial. In South America fast growing and reduced diameter species are strongly utilized in manufacturing OSC other than OSB (B.I.S. Shrapnel, (2008); therefore the necessary investment to develop this activity is substantially lower than for those wood products which require more time for the next rotation (i.e. plywood); since wood represents almost 40% of the total cost. There is no doubt that the development of the OSB industry in S.A. will represent an improvement in the utilization of renewable resources with a favorable impact in several aspects of the environment and the subsequent enhancement

of the wood based house construction in the region. In this scenario it is not evident why products with such amount of positive aspects have delayed its introduction and development in the South American continent. Conversely, other wood based panels like particle board and plywood have been intensively studied, commercialized and utilized in this region showing a highly mature status in their market share (Flyn, 2004).
This study was carried out in an attempt to unfold the causes that inhibited a greater level of maturity in the development and utilization of oriented strand composites in the South American continent.

Research and development (R&D) situation in South America

The vast majority of R&D initiatives in the basic and applied sciences in the region are initiated at the academic level. Conversely to the trend in N.A., Europe and Asia (Figure 1), in S.A. the industry plays a relatively minor role in the basic and applied research development; wood industry is no exception; some companies even borrow and apply research conducted and published in N.A. or Europe regardless of the inherent differences between the original situation and the final application.

Governmental funds are, in some countries, the only source of financing for universities and research institutions; where researches must compete for funding with higher priority disciplines such as food and health.

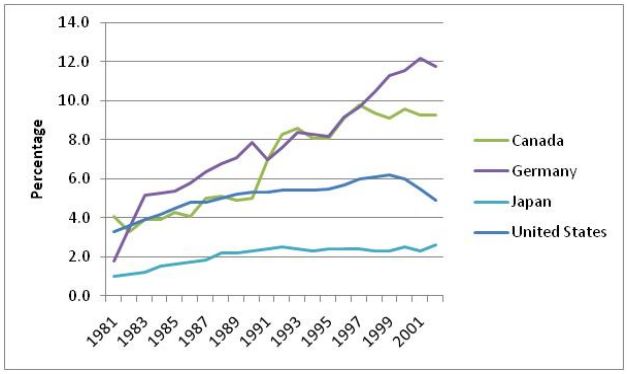

Figure 1: Percentage of R&D financed by the Industry respect to the total amount of research (Source=UMECE)

On the other hand, the lack of interaction with major international agencies on a country level results in an “under performing” situation for the entire region. Membership of researchers and scholars in scientific societies and organizations is poor and insufficient; the number of active and relevant scientific societies is low. In the Wood Science field, scattered efforts in Chile, Brazil and Venezuela often resulted in a redundant work with misuse of the limited resources available for research (Garay, 2003). This general situation affects the development of engineered products like Wood Plastic Composites (WPC) and OSCs (Smith & Wolcott, 2006).

The lack of reliable statistics makes it difficult to analyze and project the behavior of the region in this sector without considerable bias (Pepke, 2002).

General Overview of the Wood Industry in South America

The South American continent is composed by 11 independent countries and 2 associated states; which are not considered in this study due to their closer relation to European economies.

A high correlation exists between territorial area and gross domestic product (GDP). This trend (with the exception of Bolivia) is clearly observed on the graph of Figure 2; however this phenomenon might be only a scale factor effect; notice that regarding the gross national income per capita (GNI) this relationship disappears reflecting unique circumstances for each economy. The broad variety of political and economical pictures make hard to interpret this facts in a straightforward manner. Remarkably, the degree of industrial development, and particularly in the wood industry, is not correlated to the size of the economy.

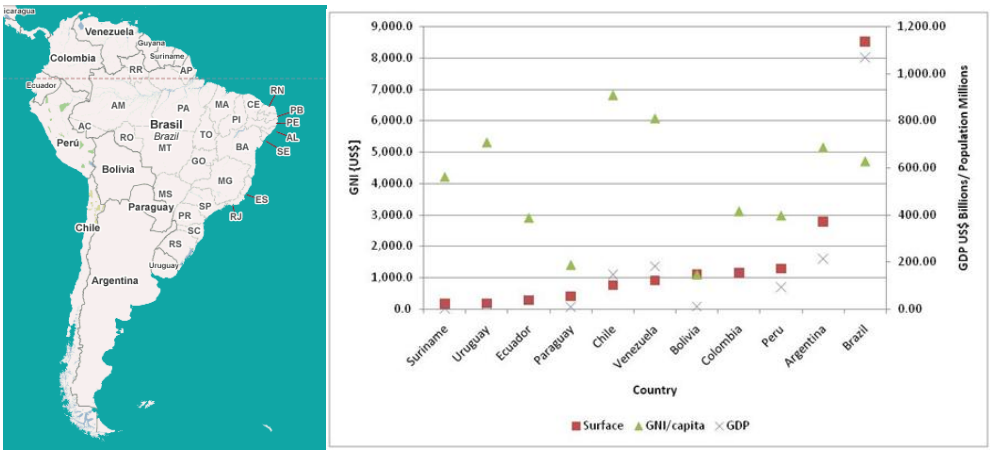

Figure 2: Map and Share of the GDP of S.A. (Source: World Bank)

In Figure 3 a comparison between low level value-added forest products (VFP) and high level VFP is presented. Note the supremacy of Brazil; Chile and Argentina in the regional participation in the production of both high and low VFP is observed. The fact that the regional level there is a high proportion of low VFP is also note worth.

Focusing on the natural aspects, some areas enclose rich forest resource stocks while some others are less favorable to the growth of forestry species. Southern countries like Chile and Argentina contain diverse climate conditions allowing the development of multiple forest product industries. Brazil, Colombia, Venezuela, Ecuador, parts of Peru, Bolivia and Argentina are immersed in the tropical region with a huge variety of high value woods and a highly developed and sophisticated market (Zhu, 1999).

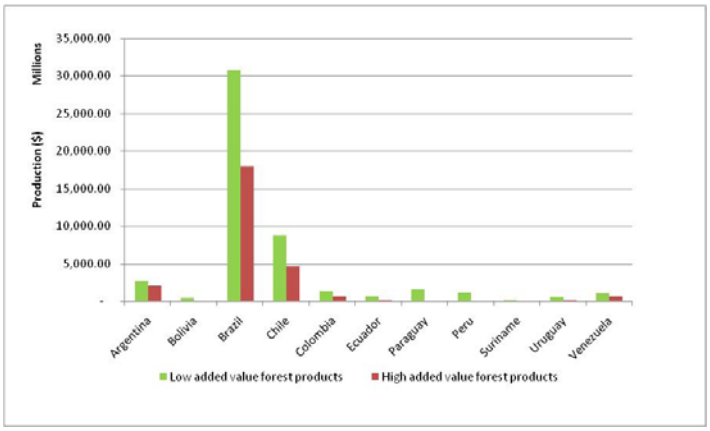

Figure 3: Comparison between high and low value-added forest products (Source FAO, 2008).

Raw materials like round wood and veneer, sawnwood and in general low VFP are the most important wood products in the region (Figure 4). Notice that charcoal accounts for nearly 7% of the total forest products produced in the region; compare with only a 1.47% of particle boards. The increasing costs of oil made for the habitants of some of the countries of the area much more affordable rely on wood-charcoal than on oil or electricity for heating and cooking.

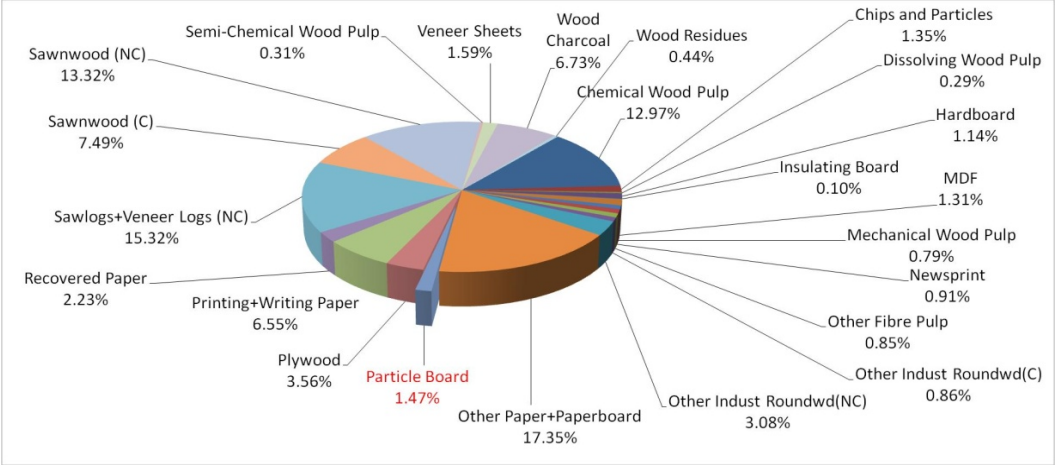

Figure 4: Breakdown of the South American region forest products production (C=Coniferous, NC= Non-Coniferous. Source=FAO (2008))

An overview of the OSB Panel Industry in South America

Plywood and particleboard products are extensively used and commercialized in the region. However these products are primarily used in the furniture industry. In Figure 5 the percentage of imports of particleboard and OSB into each country are presented.

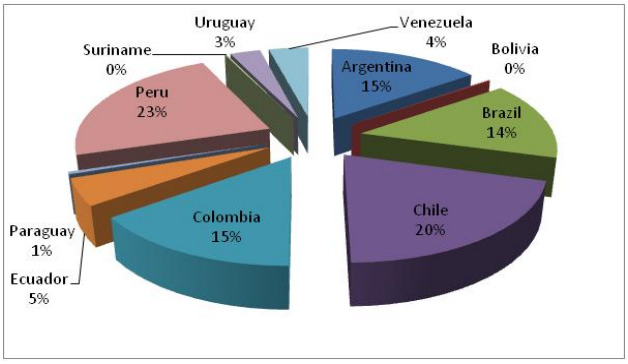

Figure 5: Particle board imports to S.A. by countries in 2006 (Including OSB/ Source=FAO)

By far Brazil is the largest producer of wood based panels (WBP) in the region; Argentina produces plywood, MDF and particleboards and since this country has potential to develop OSB, some companies have started preliminary surveys. Chile produces all the variety of WBP; however, the introduction of OSB as a structural material in the market place has been longer than expected as in the rest of S.A. although in words of Harold Stanton LP-EVP: "LP Chile has been a catalyst for migrating building practices from masonry to wood-frame construction. Frame construction using LP OSB structural panels provides homes at 70 percent of the cost of traditional masonry". Colombia, Ecuador and Venezuela produce some types of WBP; however production levels decreased over the recent past (Figure 6).

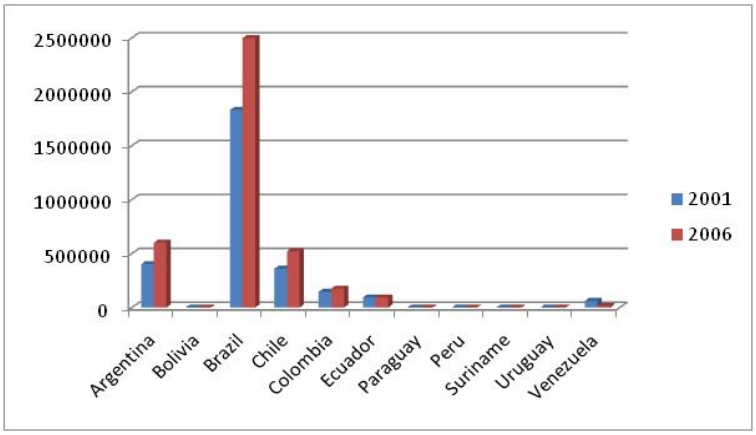

Figure 6: Production Share of Particle Boards (including OSB) in S.A. in 2001 and 2006 (Source=FAO)

Currently, only two countries produce OSB in the S.A. with only two major companies involved (LP in Chile and LP-Masisa in Brazil). In November 1998, L-P and the Chilean timber company Bomasil S.A. agreed to constitute a joint venture company to build and operate an oriented strand board (OSB) mill located on a property owned by Bomasil. The majority ownership of the joint venture company was to be held by L-P. The plant started production in May 2001 with a capacity of 133000m3/yr. The project would use 218,000m^3 annually from native forest, relying heavily on the Roble species (Nothofagus Glauca) - Rauli (Nothofagus alpine) – Coigue (Nothofagus dombeyii), in addition to a 180,000m^3 annually from secondary growth. The remaining volume of 20,000m3 annually would come from plantations of *Radiata pine* D.Don.

On the other hand, the Brazilian mill is a state of the art facility with a capacity of 350.000m^3/year. It uses 95% of Caribean pine logs; and it also allows the use of rotation periods as short as 6-year trees. It is fully automated and it requires about 24 people to operate in one shift. This mill was initially owned by Masisa S.A.; but recently the Chilean company sold 75% of the property to LP, starting a joint venture in Brazil. Since 1999, at least two attempts were made to install an OSB plant in Venezuela; but market and political fluctuations in this country have delayed the starting of this moderate size project. Recently Dieffenbacher shipped an entire facility to Venezuela. This OSB which would begin operations in 2009, is designed to produce 200,000 m^3 per year in the first expansion phase, with provision to double capacity without major interruption to production.

A new OSB plant has been announced to start operating in Chile using old equipment formerly used in Montrose, Colorado. The new mill is expected to have a capacity of 160 million ft^2/year (Louisiana Pacific, press release).

South American House Construction Activity

Spanish Heritage

It is a common assumption that the Spanish and Portuguese colonization of S.A. brought to the new land the architectural technology and knowledge formerly used in Europe. However both Iberian kingdoms were themselves fruit of rich mixture of medieval and Islamic heritages along with Renaissance thinking which allowed adaptation and inventive to flourish; particularly strongly in Brazil. The native architecture played a main role in some parts of the Continent. In Mexico and Peru Aztec and Incan settlement were definitive in the development of Mexico City and Cuzco in Peru. In other colonies where the natives did not build up a higher level of urbanization, the Spaniards developed a medieval square-based trace; the favorite construction material was sludge and straw adobe. Catholic priests brought, along with religion, the same construction method to the most remote corners of the region. The idea of long-standing or definitive construction was associated to adobe and stone construction only. Wood and other materials were only later used as beams, balconies, and roofing and to build the so called “alto de Madera”; which consisted of a second story made completely out of wood following the Andalucian (south of Spain) tradition (Perez, 2005).

In Spanish South America, after the independence period, European influences are noticeable both in public buildings and houses. Particular environmental, technological and cultural conditions are more and more evident in the different countries. However, the Catholic influence is noticeable across the entire Continent. Although diverse European styles were adopted by the wealthiest families in the new countries, all the new construction methods were based in the use of adobe, brick or stone; being wood considered neither non-durable nor reliable material and mainly used by the lower class (Carballo et al. 2001). Wood as a structural material was mostly used for industrial constructions, until steel became the favorite material.

During the second half of the nineteenth century migrations from Germany, Italy and England to S.A. influenced local communities in the use of wood as a building material. In Southern and Northern Chile and Argentina; and in some locations of Brazil the new European immigrants started a new trend on the use of wood as a construction material. Nowadays those areas exhibit a quite different urban structure and constructive methods than the rest of their countries (Perez, 2005).

Current Trends in the Housing Market in South America

Regardless of the political or economical standing of the country, a common factor related to the housing industry in S.A. is the difference in budget available and the social class of the potential owner. In general, members of high social classes build their own houses hiring private contractors utilizing high quality materials. The lower classers, on the other hand, suffer from a lack of financial resources which often leads to use of second hand or poor quality materials (Martinez, 2000). Governmental solutions have different results from country to country. Progressive housing solutions have been recently applied in social programs in the continent; resulting in a long and costly ineffective process (Escobar, 2003).

Low cost houses are promptly needed. As an example, Argentina had in 2000 a firm housing deficit of 1 million homes. Considering that the Government increased the annual average financing program from 27000 in 1989 to 53000 families in 1998 and that the population growth rate in this country is around 9.7% the deficit would increase to 2 million units by 2030 (Rezk, 2005). This situation is proportionally observed in the entire region. The condition is more concerning in countries with an under developed wood industry.

Increasing activity in the housing market creates increased demand for wood-based panels which may be observed in the imports of these products by countries of the area (Figure 7). Similar trend is observed in all the countries with different magnitudes. Peru, which does not produce WBP, has the highest rate of import in these types of materials due in part to new local housing policies. (MAEC, 2007).

Nevertheless, the use of wood in the housing market in S.A. has been reduced in comparison with other building materials wood has been incorrectly considered for high quality houses and unreachable prices for the middle class. On the other hand, wooden public social housing is generally associated to poor quality and temporary buildings. Wooden houses have a price 25% lower than using traditional materials; by using prefabricated structures the cost can be reduced even more. The use of OSB panels in housing represents a noticeable advantage that can make quality houses affordable for the vast majority of the South Americans (Perez, 2005).

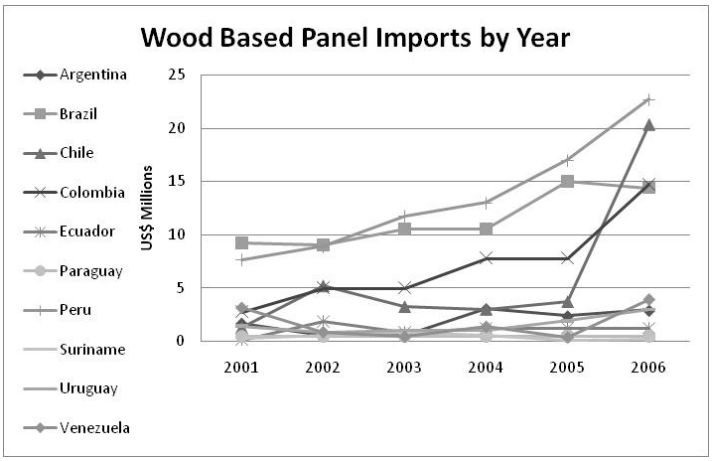

Figure 7: Import market trend by country

Opportunities

Natural Resources

The South American region has vast expanses of forest resources. On top of that, some of the largest forest lands are located in countries with a poorly developed wood industry (Figure 8). The plantation inventory available in Chile and Argentina, mostly populated with *Pinus radiata, Eucaliptus spp., Salix spp.* and *Populus spp.*, represents about 6% of the total availability of forest resources; and in some cases it has remained underutilized for many years and currently it is used as raw material for the pulp and paper industry. In Argentinean *Populus spp.* yield reaches 25m3/ha/y (MDSMA, 2000) with a rotation time of 12 years; making an OSB mill totally feasible based solely on this resource; although political and regional constrains must be considered. Peruvian, Bolivian and Colombian forests are mostly tropical woods with high commercial value; however an integral use of the forest is possible with the utilization of wood residuals such as small diameter logs and branches in the manufacture of OSCs (Pepke, 2002).

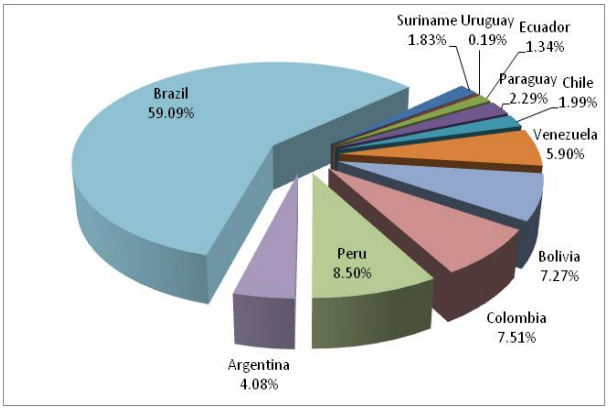

Figure 8: Percentage of forest land per country

Costs

Painter et al. (2006) published a normalized costs breakdown for OSB in N.A. (Table 1). Several differences might emerge from a similar breakdown in South America. Surely labor costs would be less than 18%; as the salary in S.A. is almost 10% the wage in N.A. Energy and Chemicals might increase due to shipping costs; although some of the chemicals are produced locally. Certainly a different cost structure would exist due to the different social and political scenarios.

Table 1: Costs breakdown for OSB in N.A.

Item	Normalized cost
Wood strands	0.358
Resin	0.173
Wax	0.038
Energy	0.100
Labor	0.177
Miscellaneous	0.154
Total	1.000

Challenges

Education, Communication and Promotion

Despite the interest of many construction professionals in the use of OSC in the housing and construction industry throughout the region, a massive and effective effort is necessary in order to expand and encourage the utilization of these materials in professionals, government agencies responsible of home construction, and home owners. The fact that there is no competitive environment for the OSC industry in the region makes it hard to justify more aggressive strategies. However seminars and courses representing the advantages of OSC oriented to professionals and agencies will increase the interest and preference for these types of products (Tokarczy & Hansen, 2006).

Figure 9: Modern construction methods

Increase Research and Innovation in the Region

In N.A., Asia and Europe research and development of OSC will continue to respond to the particular problems that the industry faces in a local or regional level such as cost reduction and biodegradation. In S.A. particular opportunities and competitive advantages, should be responded by local research in an organized and systematic

approach. Innovation stimulates new market opportunities and helps to the development of a positive competitive stream (Hovgaard & Hansen, 2004; Anderson et al., 2005). Overcoming the cultural reluctance towards the use of wood and wood composites in residential construction the principal home in South American is a major challenge for the wood industry and it will require years of persistent persuasion and education among professionals and consumers.

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