
The Effects of Globalization on the Aluminum Extrusion Industry

Bruno G. Ruettimann, *Alcan Singen GmbH*

ABSTRACT --- Globalization - and especially the opening of the Iron Curtain - is having decisive and irreversible effects on the aluminum markets and specifically on the extrusion industry. Indeed, the market rationale and transaction scheme are experiencing substantial changes, and former successful business models may now be revised under a broader spectrum.

What influence will these structural changes have on the local extrusion industry? What consequences will a "world market price" of semi-finished products have for the competitive system of extrusions? Will the logic of the rather fragmented extrusion market undergo a transformation under this new worldwide competitive threat? Will even a new paradigm crystallize and become sustainable? How will this paradigm look like? What restrictions and strategic options are likely to emerge for the extrusion plants from this new competitive configuration?

Starting from the dynamics and the reasons behind the occurring changes, this paper analyses the different types of globalization and related product characteristics as well as market structures. It examines the consequences arising from the new possibilities to manage an extrusion business on a worldwide scale with regard to the new paradigm. Furthermore, it gives a spectrum of possible strategies for the Western extrusion industry to face this changing environment. The synthesis is summarized in ten globalization postulates for the extrusion business.

I. Introduction

Mergers and acquisitions, trade deregulations, increasing competition along with growing price pressure, never-ending flow of information, interlinked financial markets, worldwide marketing strategies, reduced growth rates in traditional markets, overcapacity, and finally structural unemployment, are the appearing symptoms of the present economic system. Resultant interaction and increasing dependency on different economic and geographical subsystems have been leading to the phenomenon of globalization.

Globalization is often seen as an obscure process that apparently yields more profit for the companies on the one side and increased unemployment for the working classes on the other side. In the following we will not focus on the social aspects of globalization, but enter into the causes and effects of it, particularly with regard to the extrusion industry. Globalization is hardly controllable because it is not only a process but rather the phenotypical manifestation within the causal system of economy. A system with a multitude of actors interconnected like a neuronal network, without predominant "ganglion", and each "neuron"

governed by its rationale, evolving according to a non-controllable, but partly predictable chaotic system.

But what are the drivers behind these symptoms and - finally - of this phenomenon called globalization?

II. The Phenomenon of Globalization

The question might also be: Could globalization also have taken place last century? - No, it could not, because certain circumstances, the so-called "conditio sine qua non", were not present in the past but have only emerged during the last ten years. The underlying driving structure is complex, but clear patterns are recognizable.

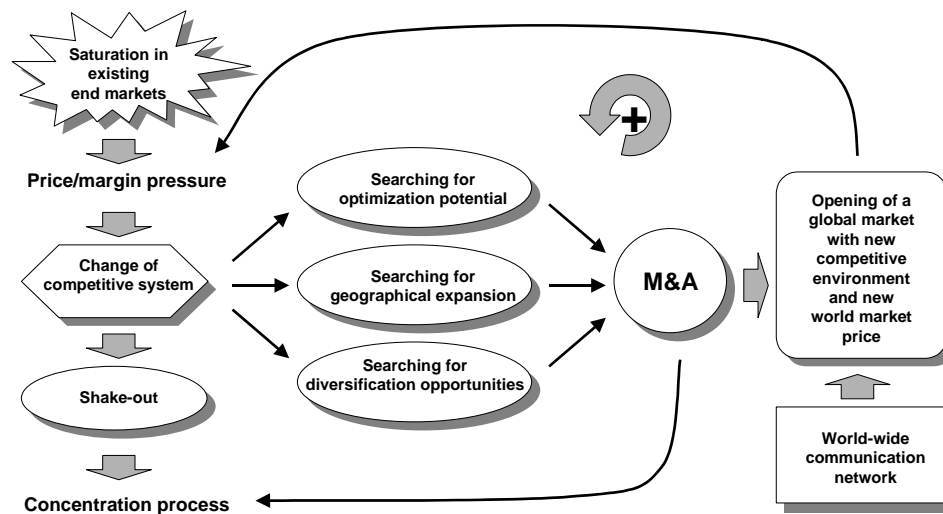


Fig.1: Main drivers for globalization [from 1]

Fig.1 shows in a simplified manner the symptoms, the causes, and the effects of the globalization phenomenon. Two main circumstances can - among others - be stated:

- The saturation of existing end markets in certain geographical areas surely provided the original impetus, supported by
- the possibilities arising from the worldwide communication network.

The saturation of present markets reflected in growth rates around max. 2 - 3 %, leads to a price and margin pressure with the consequent change of

the competitive system. One possibility is the shake-out of less competitive enterprises and the resulting concentration process; this is a merely passive behavior. A pro-active way for the enterprises to get out of this starvation situation can be synthesized in the following three options:

- a) Companies stay in the present market segment but need to optimize their offer and cost structure to improve their competitive position.
- b) Companies try to transfer their successful business model to other, economically emerging geographical areas.
- c) Companies leave their traditional business partly or even totally and look to diversify into similar or completely different fields of application.

The obvious effect is that mergers and acquisitions will happen and will further fuel the concentration process. The driving reasons for M&A operations, however, are different for the three business models, i.e.

- for a) combining the market strength of two companies in the same market by exploiting synergies mainly in the cost items of production (e.g. specialization of sites), sales force, and administration or R&D;
- for b) having access to local production facilities and distribution channels in new geographical markets with different

business culture (horizontal expansion) facilitates the market entry;
 for c) acquiring new core competence in adjacent applications or even completely new competence in growing business (business portfolio management).

On the other hand, combined strategy actions are possible as well. Nevertheless, the M&A operations have always the same objective: to gain competitive advantage by combining market and cost advantages. But only the new telecommunication technologies allow to do business on a global scale. The fields of application range from real-time financial transactions, material sourcing, but also remote process control, etc. The economic transactions are leading to a new global marketplace with the tendency to a uniform world market price that reduces price disparity. Competition will surely increase, but also the efficiency of transactions and – last but not least – the efficiency of the whole economic system, and as a consequence there will be a further rise in the price/margin pressure.

This brief analysis shows that globalization - although denounced - will happen irreversibly because the system is evolving into global dimensions, if wanted or not.

III. Deriving Typologies of Globalization

However, globalization is not equal globalization; this will become evident when analyzing the determinants of business classification. For that purpose we have to analyze the characteristics of product and related market structure.

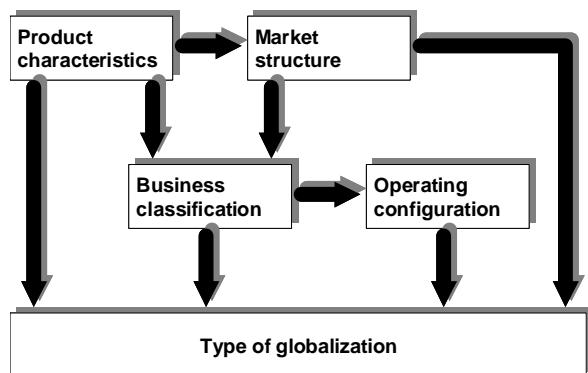


Fig.2: Framework of globalization type determinants

The morphological framework is shown by the induction scheme of fig.2. From the above framework it becomes evident that - directly or indirectly - the typology of globalization is largely set by the product characteristics.

The backward determinants themselves which influence product characteristics, market structure, and determine the business classification, and finally the operating configuration, are:

- Value of the product
- Transport cost and related range of distribution
- Production factors in terms of cost drivers
- Demand and
- Offer profile

The confrontation of product characteristics (differentiated or not) and market structure (oligopolistic or fragmented) reveals four basic business types which can be classified as follows (fig.3):

- Commodities
- Specialties
- Standards
- Convenience

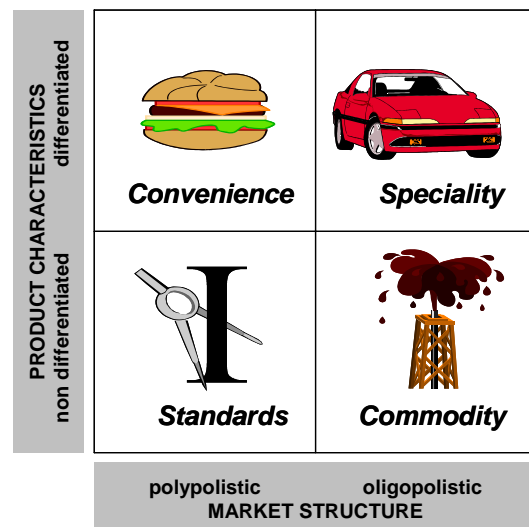


Fig.3: Basic classification of business types

The “Commodity type of business”, characterized by a predominant oligopolistic offer structure and a non- differentiated product, comprises all kinds of goods listed on efficient marketplaces like

commodities exchanges where – arbitrage effects apart – a world market price creates similar economic conditions throughout the world for every economic operator. Industries belonging to this business type, are all sorts of ore-extracting industries (aluminum, copper, and so on) as well as basic food (coffee, wheat).

The “Specialty type of business”, also characterized by an oligopolistic offer structure but with a highly differentiated product, embraces those durable or consumable goods with distinctive brand. Examples of this type are the pharmaceutical or chemical industry, the machine industry (despite SME – small medium enterprises - characteristics) as a niche market, but also the automotive industry or watch-and-clock making industry as well as the wine business.

Similar to the Commodity type of business, the “Standards type of business” covers rather non-differentiated products, but the underlying offer structure is polypolistic. The fragmentation derives from the simplicity of the product and from the possibility to produce it anywhere. The fragmentation derives also from the high transport cost compared to the value of the product or its perishable nature. Examples are the cement industry or to a wide extent also the aluminum extrusion industry, as we will see, and basic processed food (bread from the bakery).

The “Convenience type of business”, given by a differentiated product within a fragmented offer structure, embraces most products of our life sold in retail stores ranging from hamburgers, basic clothing, furniture as well as the services provided by hotels or restaurants.

It is clear that a classification of business, as shown in fig.3, is a rough model, not always covering all possibilities and not allowing a perfect fit of each business into the scheme. Nevertheless, it helps come very quickly to the essential pattern.

Once having classified the business, the question is how globalization is influencing each business type. Apart from the structural drivers already seen before, globalization is generally enhanced by two more aspects:

- On the one hand by the intrinsic nature of economic evolution given by a worldwide growing demand; this leads at first to an increase in goods interchanged.
- On the other hand a growing demand fuels the intention to participate in this opportunity to increase profits in new geographical markets.

The intrinsic causes of the underlying drivers of globalization can therefore be clearly separated and lead to distinguish two categories of enablers of globalization that we should take into consideration:

- exogen or natural, economy-driven enablers,
- endogen or built-in, profit-driven enablers.

This is why we can now logically distinguish two main types of globalization:

- Type 1: globalization of business
- Type 2: globalization of managing a business

Type 1 Globalization:

A business can become global due to the nature of the business itself, i.e. the characteristics of the product involved. If the product is characterized by e.g. a world market price, the market (or business) is no doubt of type 1 globalization because any change of the price would have repercussions throughout the world, i.e. it would have global effects. Many commodities belong to this type of globalization, also favored by the listing on efficient marketplaces like the international commodity exchanges. Type 1 globalization is accompanied by an interregional physical (material) exchange of goods produced and exported at the limit within a single-plant operating configuration. In the case of financial markets the transaction object is the information. Type 1 can - from an intrinsic point of view - be further subdivided into types 1a and 1b. 1a represents the pure example of a globalization of business. Nobody can escape from this type of globalization because its effects are spreading all over the world. Examples of this type include all commodities like coffee, raw materials (e.g. primary aluminum), but also financial products quoted on international stock exchanges. In 1b, the product characteristics are unique; they allow at the limit a centralized production within a single-plant operating configuration and exports to the whole world. The chief difference between 1a and 1b is that the price in 1a is mainly given by efficient offer-demand transactions (stock exchange), whereas in 1b the price can be fixed – to a certain extent - by the offer. This is due to the possibility of product differentiation within the competitive system. We will see later on that there is another subtype 1c of globalization existing which is of more transitional nature.

Type 2 Globalization:

If the products’ characteristics themselves have no global advantage (e.g. cement industry where the transportation charges can be higher than the value of the product itself), the way how the business is managed, can be global because

the know-how of doing business is exploited. The result is a multi-plant operating configuration managed within an international business group. In this particular case, the underlying business is rather of fragmented nature, where the local effects are not globally spread, but know-how can be transferred to other parts of the world with indirect globalization effects. This type of globalization can also be called "induced globalization". Industries belonging to that type are e.g. McDonalds, Benetton, or international hotel chains.

Type 1 globalization can also be named "material globalization" being characterized by interregional exchanges of goods (or information), whereas type 2 globalization is an "immaterial globalization" without interregional exchange of goods, and limited only to intra-regional exchange, but in each region with the similar pattern. It goes without saying, that a proper classification is not always possible and mixed patterns are existing (fig.4).

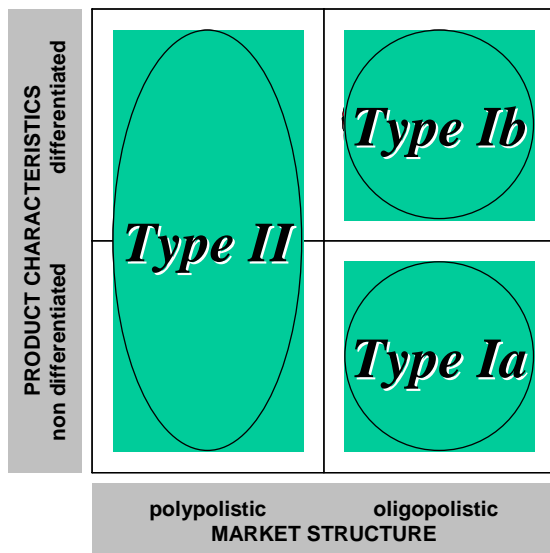


Fig.4: Deriving typologies of globalization

However, irrespective of the type of globalization we are talking about, there is no doubt that the structure of the economic system will change anyway.

And now, how does the aluminum industry fit into this framework?

Regarded as a whole, the aluminum industry is a vertical, multi-branched industry, embracing bauxite extraction, alumina production, primary aluminum production, billet/slab foundry, reroll stock

production, and foil production. It covers plants for special rolled semis, extruded semis, various types of castings, new process technologies for making components and finished products for various market segments, and finally, recycling plants (fig.5). Each and every stage of the value chain has its own market structure with its own competitive rules.

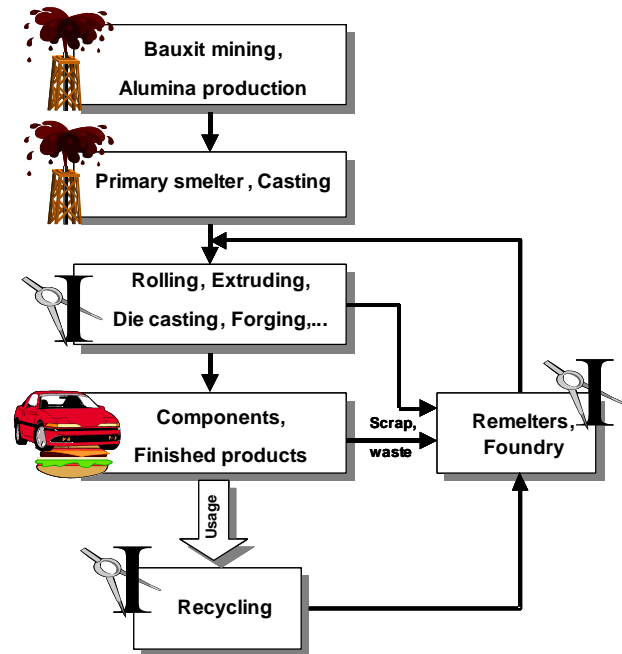


Fig.5: Aluminum industry structure and globalization type [from 1]

The bauxite, alumina and primary production decisively shows characteristics of type 1a having a worldwide unified price and being under the logic of a worldwide market. It goes without saying that in this market, economies of scale play a decisive role to achieve low-cost production. Whereas the semis production, especially extrusion, can be considered - if ever - as a type 2 globalization because of its fragmented market structure and its low degree of differentiation.

Rolling plants are more usually belonging to large international groups with a higher degree of concentration, while extrusion – and also casting plants - are with a few exceptions medium-sized independent enterprises. This difference in concentration does not only arise from the capital intensiveness of investment, but also from the individuality of the sales markets, the prevailing structure of industry and the characteristics of their products. For the same reasons, the markets served by a single plant, could until now be

classified as rather regional (extrusions) or rather national (rolled products), less often as international, and - again with a few exceptions - by no means global. Global activity is rather found in a corporate association of the plants of an internationally active group (type 2 globalization). - Is this to remain?

IV. The Characteristics of Extrusion Business

To understand the influence of globalization on the present business, we first have to understand the intrinsic nature of the extrusion business that is mainly defined by:

- the product characteristics,
- the market structure, and
- the transaction scheme (and operating configuration).

The combination of these three peculiarities determines the industry logic with an optimal operational configuration and largely sets the competition rules.

The characteristics of the product – or generally spoken the transaction object – is mainly given by the value and uniqueness of the product. The intensity of competition is independent of the intrinsic value chain, but rather depends on the possibilities to differentiate the product. With a differentiated product, specific customer groups can be addressed thus reducing direct competition on a broader scale. The less differentiation is possible on the physical product, the more important becomes the aspect of service and price, and therefore cost. Now, an extruded profile is generally a customer-designed semi-finished product. That is why - virtually spoken - the product sold is not the profile itself, but rather the production capacity since usually the customer asks three questions: Are you able to produce this profile on your presses; what is your delivery time; and how much does it cost [2]. This means that – intrinsically seen - an extrusion plant does not sell a physical product but a service.

The market structure largely sets the competitive nature of the business. It is determined by the number and concentration curve of the demand respectively of the offer. The competitive intensity and negotiation power do not only depend on the outsourcing possibility or core competence but to a great extent on whether we are in presence of an oligopolistic or a polypolistic structure, and whether it prevails more on demand or on offer.

The extrusion business is characterized by relatively low capital requirements with consequent low entry barriers; this facilitates the proliferation of a fragmented market structure (compared to the rolled industry). The characteristics of the product and the transaction scheme are still enhancing this structure. Furthermore, the know-how is not unique, and it is widely reproducible. The traditional extrusion business is therefore a business with an action range of approx. 500 km; a wider range is given by specialized extrusions like those made from hard alloys or large sections or very low-priced (from low cost countries) standard profiles (which do not necessarily have the same complex transaction scheme).

The transaction scheme describes how the product is sold. For standardized/convenience products or brandname products, the sales channel and advertising is of utmost importance because the customer can select products from shelf even on a global scale. If the product is customized, the direct interaction customer-producer becomes predominant and usually the communication/selling distance is important.

For the extrusion business – due to the particularity of the customized product – it needs close customer interaction. The profile has to be adapted to the technological constraints and usually requires several interactions; in addition, the production length complicates logistics, and transportation charges do their part.

This framework characterizes the extrusion business, defines its specific nature and sets the resultant strategies. Extrusion as a type of business has to be classified as “standards” according to the scheme in fig.3. The deriving type of globalization – if ever – would be type 2. The operating configuration of type 2 globalization is a multi-plant configuration that pursues a strategy of adding geographical market share. This market rationale is typical for a fragmented business with a limited range of action. The driver behind this strategy of globalization is to exploit the extrusion know-how and to multiply the business taking advantage of the deriving synergies of know-how and image of corporate identity.

Although the recent takeover of entire or partial groups proves that type 2 globalization is taking place, the concentration process within the type 2 logic is not predominant. As it has been shown [3], the percentage of independent extruders is growing more than that of integrated groups. Indeed, the fragmented offer structure allows the creation of new and often family-owned SME that compete

within this market logic in a regional geographic market.

V. The Dimension of Globalization

Before coming to the influence of globalization, let us have a look at the dimension of globalization. The dimension (i.e. geographical business extension) of globalization can be divided according to the typology in material globalization (or type 1 globalization) and immaterial globalization (or type 2 globalization). A qualitative evaluation of these two views allows to get a pretty good feeling of how far globalization has already evolved.

their vicinity, followed by CIS and Asia - also low-cost regions, but located farer away. CIS and Asia are also exporting globally at a range above the average. China is said [4] to become a major exporter mainly due to its very competitive cost structure. On the occasion of the 5th World Congress ALUMINIUM TWO THOUSAND held in Rome (March 18-22, 2003), a delegate from Chile stated, that Chinese extrusions are all but annihilating local plants by delivering profiles from China to the West coast of South America at 2.5 \$/kg [5]. This evolution is alarming taking into account the fact that also Chile has to be considered a low-price country.

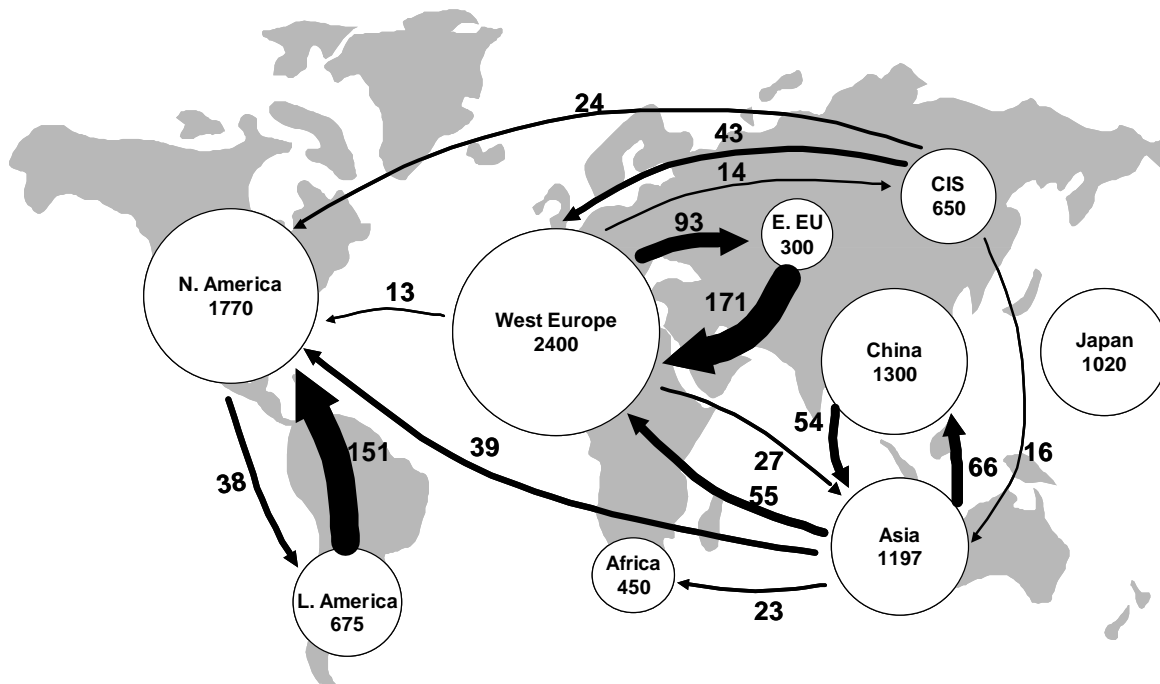


Fig.6: Global view of extrusion flows in 2001

Fig. 6 shows a global view of the physical extrusion flows between the major economic-geographical areas in the year 2001. The figures in the circles show the production of the respective geographical area. For easier understanding, only commercial flows above 10.000 tons are shown on the chart; the detailed figures can be taken from Appendix A.

The global goods interchange between the considered regions represents 10% only of global extrusions production of 9.7 mio. tons. We can see that Western Europe exports extrusions all over the world, mainly consisting of specialty extrusions. It is interesting that the lion's share of intertrade is coming from the Eastern European countries due to

Interesting is also the important share of exports of Latin America to North America. Nevertheless, within this whole context the imports in certain regions are still influenced by existing trade barriers distorting the natural economic trade flows. From the point of view of a merely physical material flow we can not yet talk about a significant global dimension of the extrusion business, confirming that we are – if ever – rather in presence of a type 2 globalization. Interesting will be a further analysis based on figures of 2003, when available, showing how the pace of growth of worldwide extrusion flows will evolve.

Group	TOTAL	N-America	L-America	W-Europe	E-Europe	CIS	China	Japan	Asia	Africa
Alcan	5			4	1					
Alcoa	45	17	11	14	1		1		1	
Bonnell	7	7								
Capral	6								6	
Corus	5			4			1			
Hydro	40	10	2	23			1		1	3
Indalex	15	15								
Kaiser	7	7								
Pechiney	9			9						
Sapa	14	2		11	1					
YKK	6	1						4	1	

Source DIAC

Tab.1: Geographical distribution and number of plants belonging to selected groups

Tab.1 shows the geographical distribution and numbers of plants being members of (integrated) groups. The analysis only considers a representative selection of international groups (not claiming to be exhaustive), but reveals the following two categories:

- 1) globally acting extrusion groups
- 2) regionally limited acting extrusion groups

The first category includes groups like Alcoa and Hydro (SAPA is starting to go in this direction), having a real global dimension of extrusion business. We can define globally acting extrusion groups that have at least more than five plants and are present in at least three different geographical regions. The remaining groups are pursuing a geographically restricted expansion strategy that mainly concentrates on Europe (Alcan, Pechiney) and on America (Indalex, Kaiser, Bonnell) or Asia/Australia (Capral). Indalex, however, seems to have initiated a cooperation with Asia Aluminum/China thus entering in a global dimension.

Why? - As we have seen, the business logic within the fragmented extrusion market calls for a market adding strategy on the basis of a local production. One reason for 2) consists in concentrating the synergy of image and management effort on an exploitable region and not to disperse it.

The second reason allows to optimize equipment and to offer in-house back-up solutions. The global strategy also depends on the financial power available to implement such a worldwide strategy; the investment in low-price economies is a must within this logic. Nevertheless, as already said [3], the extrusion market is still a market characterized by the independent SME.

Another possible way to identify new patterns, is to look at the business model typology, i.e.

- market coverage strategy (mainly soft alloys)
- technology offering strategy

This is very interesting and reveals that worldwide active groups are aiming at a market coverage (Alcoa), whereas regionally limited groups do not necessarily implement a technology-offering strategy (Indalex). An antonomasia for the market coverage strategy would be e.g. Alcoa and Hydro, and for the technology-offering strategy Alcan (as well as Pechiney and Corus). The right way of interpreting the extrusion business, is the basis for success.

Nevertheless, the recent takeovers are showing that the market share-adding type 2 globalization strategy is still predominant over the emerging type 1 globalization.

And how did the price of extrusions develop over the past years [1] ? Fig.7 shows the development of

the European semis mixed prices for rolled and extruded products in recent years. A shift of mixed prices due to varying changes in demand and new applications can of course not be excluded.

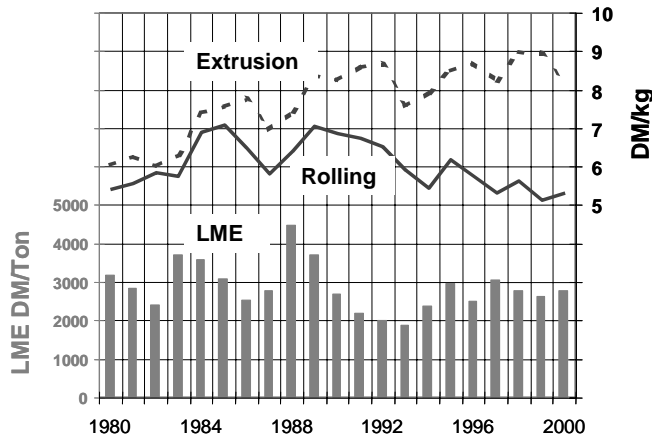


Fig.7: Comparison of price development between rolling and extrusion [from 1]

It is apparent from fig.7 that there is generally a strong but somewhat delayed correlation between semis prices and the LME. With an average metal fraction value of up to more than 50%, this is hardly surprising. It is interesting that since the opening of the East in the last ten years, the prices (and so the margins, too) for European rolled products have fallen back to what they were in 1980, while extruded products have largely been able to hold their prices. The reasons for this is twofold:

- On the one hand, extrusion plants have increasingly offered additional value-adding operations on the pure semis, leading intrinsically to higher prices.
- On the other hand, the regression of rolled product prices can also be attributed to the fact that the rolling market is showing a progressively global trend through standard sheet formats or specialized plates as commercially traded goods. Such products are traded within an efficient and quasi-perfect - although also concentrated - market with type 1a globalization characteristics. The extrusion market has a much more regional character with less interregional material flows which leads to imperfections in the price structure; the interregional price influence is therefore very limited (type 2 globalization).

We will see later on whether this will last or not.

VI. Theoretical Considerations

Are there any drivers able to compromise this apparently stable situation? Yes, there is one.

If the difference in price for the same good between different economies exceeds a certain threshold, then exports can temporarily become possible also for products of the category “standards”, e.g. extruded profiles (fig.8). The why of temporarily will be explained later. Such price differences arise due to a different cost structure in different economies. Let us call this **unstable type of globalization 1c**, originating from the price disparity between two economies of polypolistic market structure.

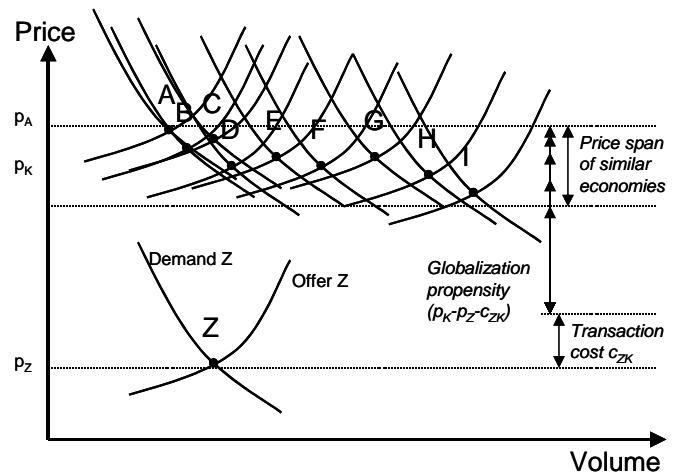


Fig.8: Price discrepancy between different economies and corresponding propensity for globalization

We can define the difference given by the prices of two economies for the same good as the propensity for globalization:

$$\Delta p_{ZK} = p_K - p_Z - c_{ZK} \quad (1)$$

where p_K is the price of a good in the economy K, p_Z the price of the same good in the economy Z and c_{ZK} the transaction cost between the economies Z and K (transportation charges between Z and K, import duties, insurance, etc.). Z represents the low-price and K the high price economies. The higher the price difference is, the stronger is the

propensity to source from an alternative economy Z rather than from the own economy K.

Is that evident? Yes, it is as we have already seen. There have always been exports (imports) from low-price economies. More than the opening of the East, the potential of the Chinese industry is making its appearance [4]. Despite their big internal market potential it seems that the Chinese extruders (and not only the extruders) with their very competitive cost structure intend to expand their exports to participate in the existing global profit-making possibilities.

How big will the globalization volume (imports from an alternative economy Z) become?

The volume potential can be expressed as follows:

$$V_{ZK} = V(\Delta p_{ZK}, s_{ZK}) \quad (2)$$

Let us call V the propensity function for globalization which models the pertinent relative volume for globalization in function of the price difference; more specifically, V_{ZK} is the volume exchange between the two economies Z and K and particularly from Z to K. It not only depends on the propensity for globalizing, but also on an additional set of variables indicated by the variable s_{ZK} which includes the acceptable delivery time, the level of service offered, or the technology needed. Of course to bridge the delivery time, consignment stocks can be a viable solution.

The following deriving expression

$$\varepsilon_{ZK} = \frac{\frac{\partial V_{ZK}}{\partial \Delta p_{ZK}}}{\frac{V_{ZK}}{\Delta p_{ZK}}} \quad (3)$$

can be defined as the elasticity of globalization between the two economies Z and K for a given price difference.

The substitution of ordinary derivative with the partial derivative is due to the fact that V does not only depend on the propensity for globalization but also on other – although less important - variables as mentioned above.

The meaning of (3) is that any infinitesimal percentage variation of price difference between the two economies Z and K results in a directly related infinitesimal percentage impact on volume

interchanged between Z and K expressed by the elasticity.

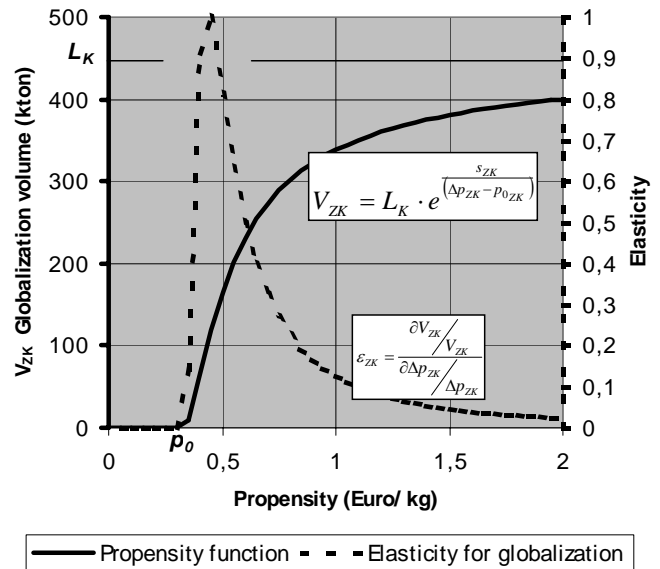


Fig.9: Propensity function and corresponding elasticity of globalization

The functional relation between the price difference and the volume is shown in fig.9. Empirically it can be stated that the corresponding elasticity of the propensity function for globalization will decrease after a sharp rise due to non-homogeneous behavior of market participants. The analytical expression of the globalization volume V can according (2) be approximated by the following typology of function to determine the propensity for globalization:

$$V_{ZK} = L_K \cdot e^{\frac{s_{ZK}}{(\Delta p_{ZK} - p_{0ZK})}} \quad (4)$$

where $s_{ZK} < 0$ and L_K is the maximum accessible volume for imports of the good in question in the economy K, and p_0 is the threshold for the economy K, compensating the risk of sourcing from the economy Z.

The corresponding derivative is:

$$\frac{\partial V_{ZK}}{\partial \Delta p_{ZK}} = \frac{-s_{ZK} \cdot L_K \cdot e^{\frac{s_{ZK}}{(\Delta p_{ZK} - p_{0ZK})}}}{(\Delta p_{ZK} - p_{0ZK})^2}$$

However, this is only the static view, i.e. the globalization potential. Indeed, the alternative sourcing is a process starting off in a small way but which can within a timeframe t attain the globalization potential expressed by the equation (4). The timeframe depends on different variables that are not subject of the discussion within these few lines.

Can the relation (2) be generalized? Yes, it can. The sum of the single globalization tendencies can be synthesized in a theoretical worldwide globalization volume. This volume is the sum of the single interregional exchanges of a good between the combination of two respective economies

$$V_{glob} = \sum_{ZK} V_{ZK} \tag{5}$$

The number of permutations between all economies, independent of Z or K, will be

$$\binom{n}{2} = \frac{n \cdot (n-1)}{2!}$$

where n is the sum of the number n_Z and n_K of the respective economies Z and K.

The real number of economies that have a price advantage and will therefore fuel type 1c globalization, is only n_Z and the resulting combinations with n_K will be smaller, like $n_Z \cdot n_K$, because only combinations between Z and K are economically advantageous and therefore realistic. Anyway, the globalization volume function will filter those permutations being negligible due to the low propensity for globalization between economies K, and only take into consideration the relevant ones between Z and K.

The deriving worldwide elasticity of globalization is as follows:

$$\epsilon_{glob} = \frac{\partial \sum_{ZK} V_{ZK} / \sum_{ZK} V_{ZK}}{\partial \Delta p / \Delta p} \tag{6}$$

What are the effects or consequences of such globalization between the two economies Z and K? The consequences are shown in fig.10.

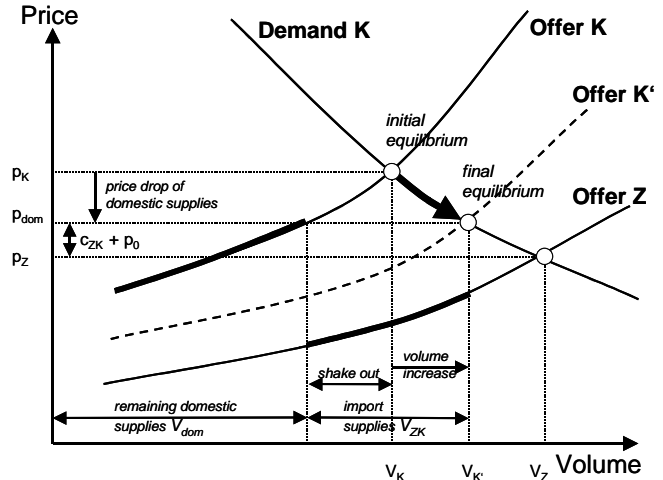


Fig.10: Price drop and shake-out in economy K due to globalization

In fact, in the initial equilibrium the domestic extruders will supply the volume V_K at the price of p_K . The appearance of imported profiles at a given price p_Z would generate a new theoretical demand V_Z provided the whole volume is imported. The imports will reduce the demand for domestic supplies by a shake-out of less competitive domestic extruders to V_{dom} with a given price p_{dom} which is lower than the initial price p_K along the offer curve K. It is realistic to assume that a certain quantity V_{dom} will remain even if its price is higher; this because of the fact that the market situation is not fully transparent or the offer performance is differentiated (e.g. extra supplied service) with preferred customer-supplier relationship. The price p_Z of imported profiles will determine the volume V_{ZK} of profiles imported from economy Z according to the propensity function. Finally, a new lower average market price $p_K = p_{dom}$ will establish with an increased demand $V_{K'}$ on the demand curve K.

The price of the good in economy K will surely drop. Extending this rationale to other economies, we state that the general price level of extrusions will most probably go down.

VII. The Emerging New Paradigm

Let us now summarize the influences of globalization on the existing business.

We found out that the product characteristics largely determine the market structure and the transaction scheme. Now, how is globalization influencing the present industry logic of extrusions?

Influence on the product:

Concerning the transaction object itself, no change on the physical product will occur, but the type of extrusion (so far mainly large sections and hard alloys only) will be extended to include special extrusions or standard-like products from low-price countries participating in the globalization phenomenon. As already mentioned, the object of transaction is rather the production capacity and not the profile itself. For this particular reason, the service and the price will become even more important within this new scenario, as we will see.

Influence on the market structure:

The globalization strategy of an international group – of type 2 globalization – will not change the structure of the market, i.e. the market rationale remains unchanged and so does the transaction scheme. The emerging type 1 globalization is yet too limited to cause drastic changes but the reduction of the price level will lead to a natural shake-out of some less competitive extruders. As time goes by and with an increase of global trade, the probability exists that a price situation similar to a world market price will have a decisive impact on the existing system. However, the prerequisite for a real world market price still is the availability of a sufficient quantity of the product at that reference price.

Influence on the transaction scheme:

The classic transaction scheme will not be substituted but rather completed by additional forms of transaction such as internet bidding. Besides the form of the transaction medium, the new scheme will generate a world market price which ultimately could have reference character; the consequences are easily to imagine.

And now? - Following conclusion can be drawn from an in-depth analysis. Fig.11 shows in a simplified manner the dynamics of an interdependence arising between type 1c and type 2 globalization. More specifically: The arising globalization is of a new type because it has neither

the nature of 1a nor the nature of 1b. Indeed, the new type 1c is generated only by the price difference between two economies (which is a *conditio sine qua non* to be classified as type 1c) and it will last as long as the price difference will last. But let us analyze the arising globalization dynamics:

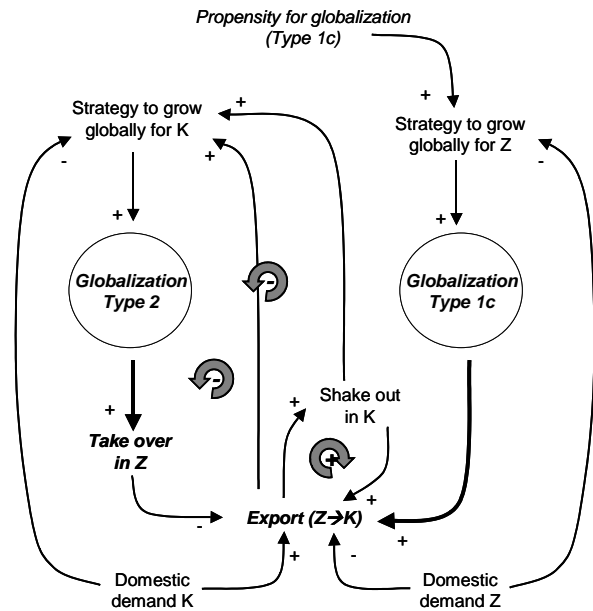


Fig.11: Dynamics of paradigm change in fragmented markets

A shrinking domestic demand (i.e. saturation of existing markets) in the economy K will favor the strategy of global growth according to the type 2 globalization pattern within the logic of fragmented extrusion markets by taking over companies in other strategically interesting economies K or emerging low-price economies Z. Existing price differences between economies K and Z will favor the propensity of economy Z to export to the economy K by implementing a strategy of global growth according to the type 1c globalization pattern; a domestic demand in Z which is less than the domestic production capacity, will even favor this strategy. The increasing low-price exports to economies K will lead to a slow, but persistent shake out of weak companies in economy K, further fuelling the demand for imports from Z. The shrinking market shares of integrated groups in economy K by increased imports from Z will lead to enforce the takeover strategy of companies in Z in

order to participate in this new, profitable source or to control imports to economy K to protect the domestic market shares. The increasing shake-out will also favor the strategy of takeover. The result would be a reduction of material flow from economy Z to K, limiting further shake-outs and returning to the fragmented market structure with its natural business logic. The dynamic equilibrium will be controlled by the three existing feedback loops and will only settle with shrinking propensity for globalization; the presence of two negative (stabilizing) feedback loops suggests the survival of type 2 globalization; however, only the future will show the real predominance.

Now, which is the new paradigm? – Before the visible appearance of the globalization phenomenon, the extrusion business with its fragmented structure could be considered as the “thesis” according to the Hegelian dialectic. The content of the business nature has been described in the above chapter “The characteristics of extrusion business”. The type 2 globalization is not drastically influencing this nature of business, leaving it as a locally limited business with low interregional influence.

This “thesis” is faced with the “antithesis” – driven by temporary type 1c globalization – in the form of low-priced imports which can damage the domestic economy to the extent that well established business relations are re-evaluated. The beginning of a structural change is foreseeable in the mid-term if the type 1c phenomenon reaches its critical mass.

From this constellation, of on the one hand locally active independent extruders or even integrated extruders (with or without type 2 globalization strategy), and on the other hand the export-driven formula of type 1c globalization oriented extruders, emerges a “synthesis” in form of a new – let us call it - **eclectic market type** where the fragmented market structure will remain but where the business logic will have to face a worldwide direct competition thinking. The co-existence of two market rationales has only transitional character, but will last for many years. The foreseeable changes are not negligible and will have a considerable impact on the present industry logic.

How long will this unnatural situation last? - It will last as long as the economy Z has a cost advantage over the economy K, and as long as the available production capacity exceeds domestic consumption. As regards the cost advantage, this will last for decades [1].

VIII. Restrictions and Strategic Options for Extruders

What to do within such a context? For obvious reasons only some aphorism will be given regarding the possible business models. – Not only the evolving globalization dynamics but also the possible action space of extruders have to be seen under the present natural restrictions of limited market growth in mature economies [6]. In addition, the price pressure further reduces the extruders' freedom to act and fosters the management to generate new ideas to face this challenge. On the other hand the downward oriented price spiral will open the aluminum market to new applications offering new sales opportunities to the domestic companies.

Now, do independent extruders have a chance to survive? Yes, they do. If the cost structure remains competitive (i.e. low overheads and high automation level) and the adopted business model is convincing, the fragmented market structure allows the domestic region to become a geographically limited, idealized monopoly.

Is there an advantage of being part of a group? - Intrinsically seen as extruder – no, with some exceptions (e.g. still existing competition-distorting advantage of duty regulations for international operating, backward-integrated groups) because being part of a group does not offer any evident competitive advantage in a fragmented market – image advantage and benchmarking possibility apart. The advantage has to be seen on group level with the possibility to pursue a portfolio policy on the basis of a type 2 globalization strategy.

Are M&A reasonable in the extruders market? Yes, for the implementation of a type 2 strategy they are. But it is not a general response to the threat of a type 1c globalization; it does make sense when the concerned M&A are targeted to candidates belonging to low-price economies.

Which is now the strategy spectrum for extruders in a high-price economy, and which is the optimal business model for success?

Generally we have to distinguish the strategic action space for:

- family-owned SME,
- integrated multinational groups,

and three possible basic strategy orientations:

- defend the local market position,
- play the new game and become export oriented,
- intensify type 2 globalization strategy.

The necessary core competence to build up the respective USP (unique selling proposition) within each possible constellation, is of course very different – to make a mistake can be decisive and fatal.

COMPANY TYPE Independent SME Group Integrated	Concentrate on service (cost remains an issue)	Technology or solution driven	X
	Idem	Idem, but exploit specialization within the network	Take over / JV in economy Z
Defend Export Type 2 BASIC STRATEGY ORIENTATION			

Fig.12: Action spectrum of Western extruders

Fig.12 shows the action spectrum of Western extruders. Generally spoken, the only possibilities for an extruder to compete within this kind of business typology [7] are:

- cost leadership
- service leadership
- technology leadership

and of course the combinations thereof. Now, where is it reasonable to apply which option?

The option of cost leadership is no means to defend the local market position, because the obtainable price level is hardly competitive against the very low-price imports – otherwise we would not have to fear the low-price imports. The option of technology leadership opens a wider spreaded geographic scope not necessarily to be restricted to the domestic market. Therefore, the most convenient strategy is to become service leader and to focus on those customers who rather aim at a higher service level than at lower prices. However, it is not subject of this paper to enter into the various possibilities of performing these services.

In order to become more export-oriented you need to have a real USP. Of course, the cost leadership option can be ignored because it is hardly implementable in a high-price country. The service providing idea is difficult to be implemented over large distances. The winning strategy is to sell a technological USP that is not available from extrusion plants in other countries. Also in this field

there are different options which are, however, beyond the scope of this paper.

The implementation of type 2 globalization strategy is rather a flight ahead, leaving the problem of declining cost competitiveness in the domestic market unsolved. For an internationally operating group this might be secondary because of its predominant portfolio-based business model. Family-owned independent SME will – for different reasons – hardly follow such a strategy.

IX. The Ten Extrusion Postulates of Globalization

Based on the ten general postulates of globalization [1] which continue to be valid, and the new insights gained we can formulate these ten new postulates for the extrusion business.

1. Type 2 globalization will not change the fragmented market structure and its related market rationale.
2. Family-owned independent SME will continue to exist in concomitance of group integrated extruders.
3. The new opportunity of internet bidding can create the preconditions for a new world market price.
4. Price differences in different economies will generate a propensity for type 1c globalization.
5. This type 1c globalization is unstable, and has only transitory character (still lasting for many years) because of growing overseas demand and shrinking propensity for globalization.
6. A new eclectic market type is potentially arising with a still fragmented market structure but type 1c world price characteristics.
7. Price level in high-price economies will drop temporarily as long as the price differences will exist.
8. Shake-out of less competitive extruders is foreseeable.
9. Demand will increase due to the lower price level and open the access to new applications.
10. Extruders situated in high-price economies will have to further concentrate their offer on service or technology based performance.

These ten postulates are covering the economic dimension of the globalization effects on the extrusion business, but do not touch the inherent socio-political aspects. Nevertheless, these socio-political consequences will become the real challenge to face in the forthcoming future. – As

regards the economic dimension, the future will show if these ten postulates will materialize.

X. Summary

The economic world of extrusions is undergoing subtle but decisive changes. The former long-lasting equilibrium in a fragmented market structure with its specific rather regional business model is destabilized by the globalization effects.

Despite the fact that extrusion is fundamentally belonging to type 2 globalization - without any direct global price influence -, the price of extruded profiles will decrease if the material (physical) globalization volume will become large enough, because in this particular case the type of globalization can temporarily (given the respective propensity) switch to type 1c.

The increasing flow of low-priced extrusions will lead to a shake-out of less competitive extruders if they are not able to create a new USP to defend their present markets or to gain a new customer base. – For this reason, the management has to become inventive in order to revolutionize the extrusion business idea. But how? Whoever answers this question, has not to fear globalization.

XI. Acknowledgements

Thanks to Bob Lambrechts (EAA, Statistical Officer) providing the base data for the worldwide material flow analysis. My very special thanks to Antje Krause-Kramm (Alcan) for the patience in correcting the English text as well as to Urs Fischer (Alcan, President of Sector Automotive & Transportation) for the interesting discussions about globalization.

XII. References

1. Ruettimann B., Globalisation and the Effects of the Opening of the East on the Western European Aluminium Semis Industry, *Proceedings of 5th World Congress ALUMINIUM TWO THOUSAND*, Rome May 18-22, 2003, Interall publications
2. Ruettimann B., Strategy and Tactics in the Aluminium Semis Industry – part 1, *ALUMINIUM 78* (2002) 1/2 , Giesel Verlag

3. Conserva M., The Role of Independent Transformers on the Aluminium System, *Proceedings of 5th World Congress ALUMINIUM TWO THOUSAND*, Rome May 18-22, 2003, Interall publications
4. Benson Wu, The Competitiveness of Chinese Aluminium Extrusion Industry, *Proceedings of 5th World Congress ALUMINIUM TWO THOUSAND*, Rome May 18-22, 2003, Interall publications
5. Swap C., Rome World Conference, *Aluminium Extrusion*, The International Magazine of the Aluminium Extrusion Industry, Quarterly Journal – Year 8, 2/03, Edimet
6. Gyöngyös I. and Rüttimann B., The Future of the Aluminium Industry, *ALUMINIUM 76* (2000) 4, Giesel Verlag
7. Ruettimann B., Strategy and Tactics in the Aluminium Semis Industry – part 2, *ALUMINIUM 78* (2002) 4 , Giesel Verlag

XIII. Author

Bruno G. Ruettimann, Dr. Ing. MBA, studied at the Polytechnic Institute of Milan and at the Bocconi University, Milan/Italy. Since 1988 he has been working with the former Alusuisse Group (now Alcan) in various capacities and is now based at Alcan Singen GmbH/Germany where he is in charge as Director of Strategy and Business Development for the Alcan Automotive business unit.



Appendix A: Global Production, Consumption and Trade Balance of Extrusions (2001)

From (in tons)	Africa	Asia and Oceania	China	Japan	East Europe	West Europe	CIS	North America	Latin America	Total	Consumption	thereof Import	in %
To													
Africa	445543	23436	5161	2254	44	9403	102	518	91		486552	41009	8%
Asia and Oceania¹⁾	903	992927	53587	9423	510	26793	15588	9506	353		1109590	116663	11%
China	61	65802	1225717			1789	1070	1884	2		1296325	70608	5%
Japan		2439		1006438		1707		3102			1013686	7248	1%
East Europe²⁾	142	6476	8		117439	93367	2565	112	6		220115	102676	47%
West Europe	3256	54631	5963	274	172720	2233827	43398	6487	10255		2530811	296984	12%
CIS³⁾	88	6384	114		3906	14067	563427	96			588082	24655	4%
North America⁴⁾	7	39443	8400	1518	3377	13305	23762	1710488	151219		1951519	241031	12%
Latin America⁵⁾		1628	1050	93	39	6424	4	37807	513074		560119	47045	8%
Not specified		3834			2647	87	84		53		6705	6705	
Total											9763504	954624	10%
Production	450000	1197000	1300000	1020000	300682	2400769	650000	1770000	675053	9763504			
thereof Export	4457	204073	74283	13562	183243	166942	86573	59512	161979	954624			
in %	1%	17%	6%	1%	61%	7%	13%	3%	24%	10%			
Net Export	-36552	87410	3675	6314	80567	-130042	61918	-181519	114934				
Potential consumption coverage	0,92	1,08	1,00	1,01	1,37	0,95	1,11	0,91	1,21				
Trade ratio	0,11	1,75	1,05	1,87	1,78	0,56	3,51	0,25	14,35				

Intra-regional flow (e.g. Africa to Africa) shows the own consumption of the own production

¹⁾Including India, Syria, Yemen, Bahrain, Malaysia, Israel, Australia and New Zealand

²⁾Including Bosnia-Herz., Croatia, Slovenia, Macedonia and former Yugoslavia

³⁾Azerbaijan, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Belarus, Baltic States, Moldavia, Russia, Ukraine

⁴⁾USA and Canada

⁵⁾Brazil, Argentina, Mexico and other countries

Source EAA