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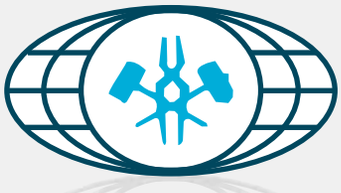
NEWSLETTER

Volume I, June 2009



ICSOBA

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C. R. PRADHAN
DIRECTOR (PROJ. & TECH) &
CHAIRMAN-CUM-MANAGING DIRECTOR I/C.
& PRESIDENT, ICSOBA

D. O. No. ICSOBA/124
Date 15th June' 2009

Dear Prof. Ramachandran,

I am glad to learn that ICSOBA secretariate is bringing out of the 1st edition of the ICSOBA News Letter in June, 2009 highlighting the activities of ICSOBA and present world scenario in the field of Bauxite, Alumina & Aluminium.

Further, I am happy to note that in the meantime ICSOBA Presently and Council Members have been reconstituted drawing expertise from various Alumina Industries, Academia and Research Communities all over the world.

Furthermore, it is matter great pleasure that the next ICSOBA Symposium is going to be held in China in November, 2010 as per the suggestion made in the lat ICSOBA General Assembly Meeting held at Bhubaneswar in November, 2008.

Again the shifting of ICSOBA Secretariat to Mineral information Development Centre (MIDC) Nagpur, India ha added a new dimension to the entire activities of ICSOBA as the focus of Global Aluminium Industry has now been shifted to Asia and India in particular. We should work hard to make ICSOBA vibrant and visible, so that networking between Aluminium Industry, Academia and Research become stronger day-by-day to encompass the global Aluminium Community as a whole.

On this memorable occasion I convey all my best wishes for success of the endovour in bringing out the 1st Edition of ICSOBA News letter in June, 2009.

With warm regards,

Yours sincerely

C. R. Pradhan)

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ICSOBA Secretariat,
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FOREWORD

Greetings from the ICSOBA Secretariat. We are interacting with you after our meeting in Bhubaneshwar last November when we had a successful three day Congress highlighted by the presentation of over 60 technical papers, a special session on alumina technology, visit to the National Aluminium Company plants and above all a lively meeting of the General Assembly. As you are already aware it was decided to shift the ICSOBA Secretariat to Nagpur. The Newly elected Presidency has taken over from December 2008 and the Secretariat is now fully functional in Nagpur. We also have the 20 member ICSOBA council with eminent personalities drawn from bauxite, alumina and aluminium fields from all over the world.

As we start our activities in Nagpur we recall with great pride the rich heritage of ICSOBA, It was founded in 1963 by the Yugoslav Academy of Sciences and Arts (presently the Croatian Academy) ably supported by the Hungarian Mining and Metallurgical Society (OMBKE). The goal of ICSOBA was to promote the exchange of ideas and results of work from different fields of research related to bauxite exploration and exploitation, alumina and aluminium production, by organizing conferences and symposia, field trips to important mines and plants and publishing the technical journal, Travaux de l'ICSOBA. In the span of about 46 years, ten meetings of International Congress and seventeen International symposia were organized in venues located in Europe, Canada, Jamaica, Brazil and India. The organization has members from countries all over the world, with the peak figures touching over 200 from 30 countries. In keeping with the shift of focus of bauxite, alumina and aluminium related activities to the Asian and Australian regions; it was decided by the ICSOBA General Assembly to relocate the Secretariat in Nagpur India and to hold the next technical meeting in China.

The Presidency and Secretariat of ICSOBA are in the process of finalizing the venue for the next Meet. It has also been decided to bring out half yearly News Letters to inform the members about the developments taking place. The first issue is released now and the second one will be out in December 2009. We would like to include two to three technical papers in every issue besides information on important bauxite mines/alumina and aluminium plants summarizing the salient features. The ICSOBA website is now ready and can be reached at icsoba.org.

In order to sustain our activities, we need you whole hearted cooperation in a number of ways. First we need to enrol as many members as possible; application form for membership can be found in this issue. We need technical contributions as well as information on various mines and plants. You may also give a thought as to how to make the next meeting in China a grand success. Please give us your feedback on how to improve the contents of the News Letter.

We look forward to your active cooperation.

(A.K. Nandi) (H. Mahadevan (T.R. Ramachandran)

Cost Competitiveness of Indian Alumina Refineries

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Abstract

India has adequate reserves of bauxite of good quality. The specific bauxite consumption of Indian alumina plants is comparable to their counterparts abroad; the organic content of the ore is also low. In spite of these favorable factors some of the plants face problems of sustained supply and high transportation costs. There is ample scope for reducing the conversion costs, particularly in plants which use old technology.

Introduction

Low cost is the only winning and sustainable strategy in any commodity business. alumina has been thought to be a commodity in the true sense only in the recent past, as trading of the mineral picked up in the late 1980's. With the setting up of large capacity plants in Australia, Brazil, Venezuela and Jamaica, true trading of the mineral started and this has brought in its wake all the perils of the commodity industry. It has become essential for the alumina refineries to be competitive even when they are a part of an Integrated Aluminium Complex due to shrinking of the borders, free trade and easy dispatch. The yardstick for measurement of competitiveness has always been the ultimate cost of production of the material. This might not be true under certain circumstances, as a fully depreciated existing plant, with a high cost of production, is able to survive well during the downturn as in the existing market. But this is only an illusion and all facilities with higher costs would perish in the long run. This phenomenon is clearly visible in the alumina Industry from the last decade and would be more so in the coming years.

Alumina and Aluminium Production Statistics

Country-wise alumina production capacity is shown in Fig. 1. Australia accounts for nearly 29% of the capacity, while the Indian share is ~5%. The existing annual world alumina and aluminium production capacity is around 89 and 40 million tons respectively (Table - 1). 9 major companies together contribute to as much as 65% of the production; the total capacity of the Indian alumina plants is 4.8 million tons.

Technology and Consumption Norms

Technologies available for alumina production and those prevailing in the Indian plants are worth detailing. Presently available technologies are from Alcoa, Rio Tinto – Alcan, Gami and open book technologies / process design by notable engineering companies including WorleyParsons, Hatch etc.. There are certain others in the business who supply only part technology. All these alumina production technologies are based on the Bayer hydrometallurgical extraction of alumina from bauxite using caustic liquor as the medium. The individual processes differ from one another in a multitude of details. While each one of the above technologies have their own merits and demerits, all the options are technically acceptable for a given bauxite. However owing to the variations in the process conditions there would be variations in the raw material and energy consumptions, capital requirement, operational convenience and future developmental aspects.

* Views expressed in the article are not to be construed as that of the Company represented.

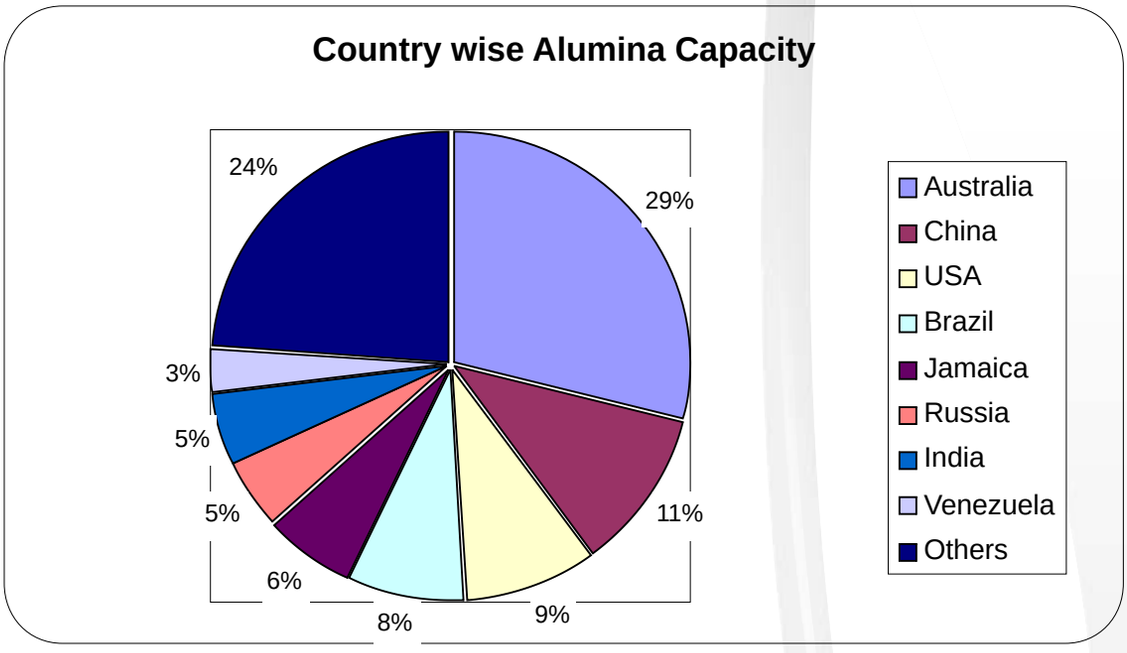


Fig. 1: Country-wise Alumina Production Capacity

Table – 1: Alumina and Aluminium Production Capacities of Some Major Plants in the World

Producer	Aluminium	Alumina
	Capacity Mtpa	
Alcoa	4,652	15,844
UC Rusal	4,633	11,411
Chalco	4,254	10,815
Rio Tinto Alcan	4,126	9,998
Hydro	1,963	2,706
BHP Billiton	1,348	4,495
Dubal	950	
Alba	858	
Century Aluminium	789	
Vale		3,568
Others	16,059	29,984
Total	**39,632**	**88,821**

All the technologies In India, with the exception of Vedanta (2007) and Nalco (1984) are of the 1950's and 60's. However most of the individual plants have carried out a number of modifications, both in process and equipments, to increase the capacity and also productivity. The data on the Indian plants presented in Tables 2 & 3 would reveal the status of technology in the existing Indian plants and the range of consumption of raw material and energy in the plants. The data for these tables have been collected from a number of sources – those available in public domain and private communication, and analyzed.

Table – 2: Technologies Prevailing in the Indian Alumina Plants.

Particular	Vedanta			Nalco	Hindalco		
	Lanjigarh	Malco	Balco	Panchpatmali	Renukoot	Belgaum	Muri
Capacity MTPA	1.4	0.11	0.2	1.6	0.70	0.39	0.5
Technology	WorleyParsons	Monte-catini	Alu-terv	Pechiney	Kaiser	Alcan	Alcan
Digestion	LP	LP	HP	AP	HP	LP	LP & HP (Double Digestion)
Desilication	Pre	Post	Pre	Post	Pre	Post	Post
Precipitation	Hybrid	AMERI	EURO	PECH	AMERI	AMERI	AMERI
Causti-cization	LIQ.	NIL	MUD	LIQ.	MUD	LIQ.	LIQ.
Salt removal	NO	NO	YES	NO	YES	NO	NO
Organic removal	YES	NO	NO	YES	YES	NO	NO
Calcination	GSC	ROT.	ROT.	FB	GSC	ROT.	FB.

HP-High Pressure, LP-Low pressure, AP-Atmospheric pressure, Euro - European, Pech - Pechiney, Ameri - American, LIQ- Liquor, ROT-Rotary Kiln, FB - Fluid Bed Calciner, GSC - Gas Suspension Calciner

Table – 3: Raw Material and Energy Consumption in the Indian Alumina Plants.

Raw Material	Consumption/ton alumina	Raw Material	Consumption/ton alumina
Bauxite (t)	2.6 - 3.0	Fuel Oil (l)	80-130
Caustic soda (kg)	65-110	Cumulative thermal energy GJ/t	12-16
Lime (kg)	30-100	Process Efficiency	
Energy		Digestion Efficiency (On TA basis) %	75-90
Steam (t)	2.3-4.6	Precipitation Efficiency %	44-52
Electricity (kWh)	200-400	Liquor Productivity kg / m^3	58-80

Analysis

Based on the information presented above, the competitiveness of the Indian alumina industry is analyzed in relation to the other refineries in the world in this section.

Bauxite:

The consumption parameters are highly dependent on the bauxite quality and its mineralogy. To start with let us analyze how Indian bauxite is placed vis-à-vis the other resources in the World. Figures 2 - 5 below give the characteristics of Indian bauxite resource in relation to those in other parts of the world in terms of quantity and quality.

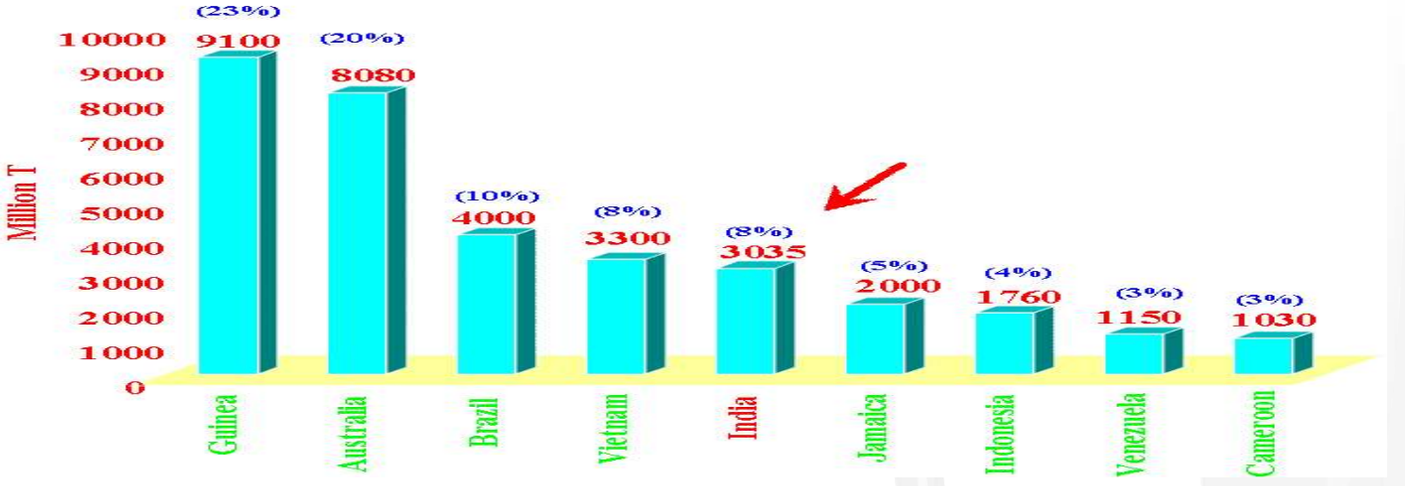


Fig. 2: Bauxite Reserves in Various Countries in the World

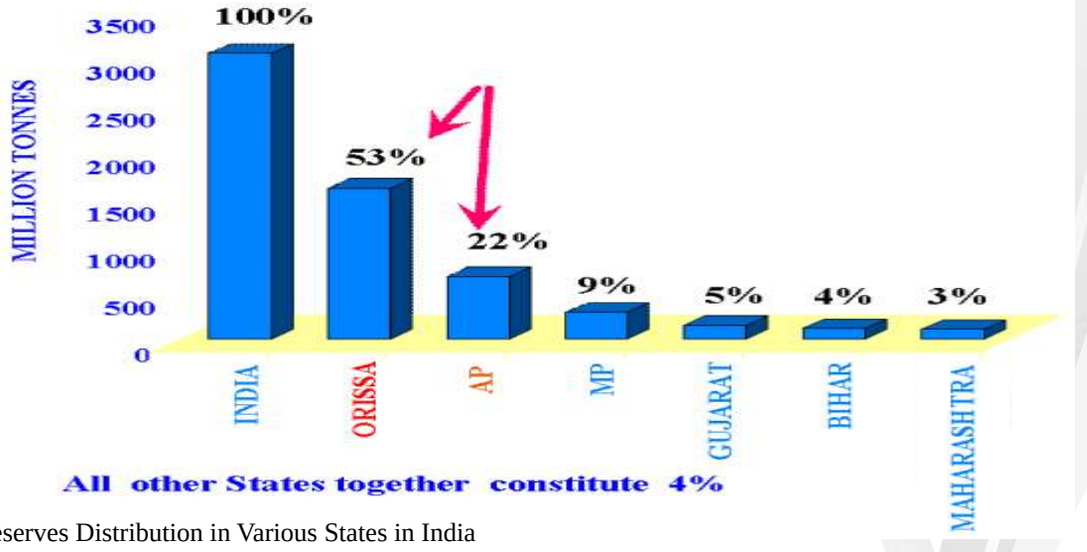


Fig. 3: Bauxite Reserves Distribution in Various States in India

The specific consumption of bauxite in the Indian alumina refineries is between 2.6 to 3 t/t; this is comparable to the corresponding figures of most of the alumina refineries in the world except for those in Western Australia, which process low available alumina bauxites. Also Indian bauxites have very low organic content, which allows easy processing and higher productivity. However an anomaly for the Indian refineries is that in spite of the abundance of bauxite in the country, most of the existing refineries are starved of bauxite and are required to process different mix / variety of bauxites. The Indian refineries pay landed cost of bauxite in the range of US $ 6 – 15 per ton.

Table-5: Consumption Data of a few of the Alumina Refineries

Digestion Technology	Plants	Capacty mtpa	Consumption T / t alumina		
			Bauxite	Caustic	Energy (GJ)
High Pressure Digestion	Stade	950000	2.6	0.088	9.40
	Distomon	1100000	2.2	0.115	9.63
	Sherwin	1600000	2.4	0.081	11.15
	Queensland	3900000	2.2	0.080	11.17
	Alpart	1650000	2.45	0.081	12.70
	Hindalco	700000	2.68	0.106	11.17
	Balco	205000	2.8	0.130	14.58
Low Pressure Digestion	Gove	3300000	2.5	0.083	11.0
	Pinjara	4200000	3.3	0.060	12.0
	Wagerup	2500000	3.3	0.057	11.58
	Worsley	3450000	3.5	0.070	10.45
	Point Comfort	2305000	2.35	0.075	10.92
	Muri	225000	2.7	0.080	12.6
	Vedanta	1400000	2.8	0.073	10.0
	Belgaum	485000	2.55	0.085	10.7
	CAR	1400000	2.96	0.095	12.2
	Kwinana	2150000	3.5	0.068	11.09
	Alumar	1600000	2.38	0.079	9.76
	Alunorte	4200000	2.27	0.086	8.84
	Bauxillium	2000000	2.5	0.051	10.22
Atmospheric Digestion	Friguia	640000	3.0	0.080	10.9
	Nalco	1600000	2.8	0.071	11.5

* - Data not available

Summary

Various factors influencing alumina production are analyzed. There is scope for reducing the cost of production in the relatively new Indian alumina plants by ~$5/t by improving the process productivity. For the other plants, this reduction can be higher but it involves optimum utilization of man power and improved productivity.

Acknowledgements

The author wishes to express his sincere thanks to Dr TR Ramachandran, NFTDC, Hyderabad, India and Mr George (György) Bάnvölgyi, Technical Director, Ban-Volgy Limited Partnership, Budapest, Hungary.

Fig.6: Energy cost comparison of Various Alumina Plants

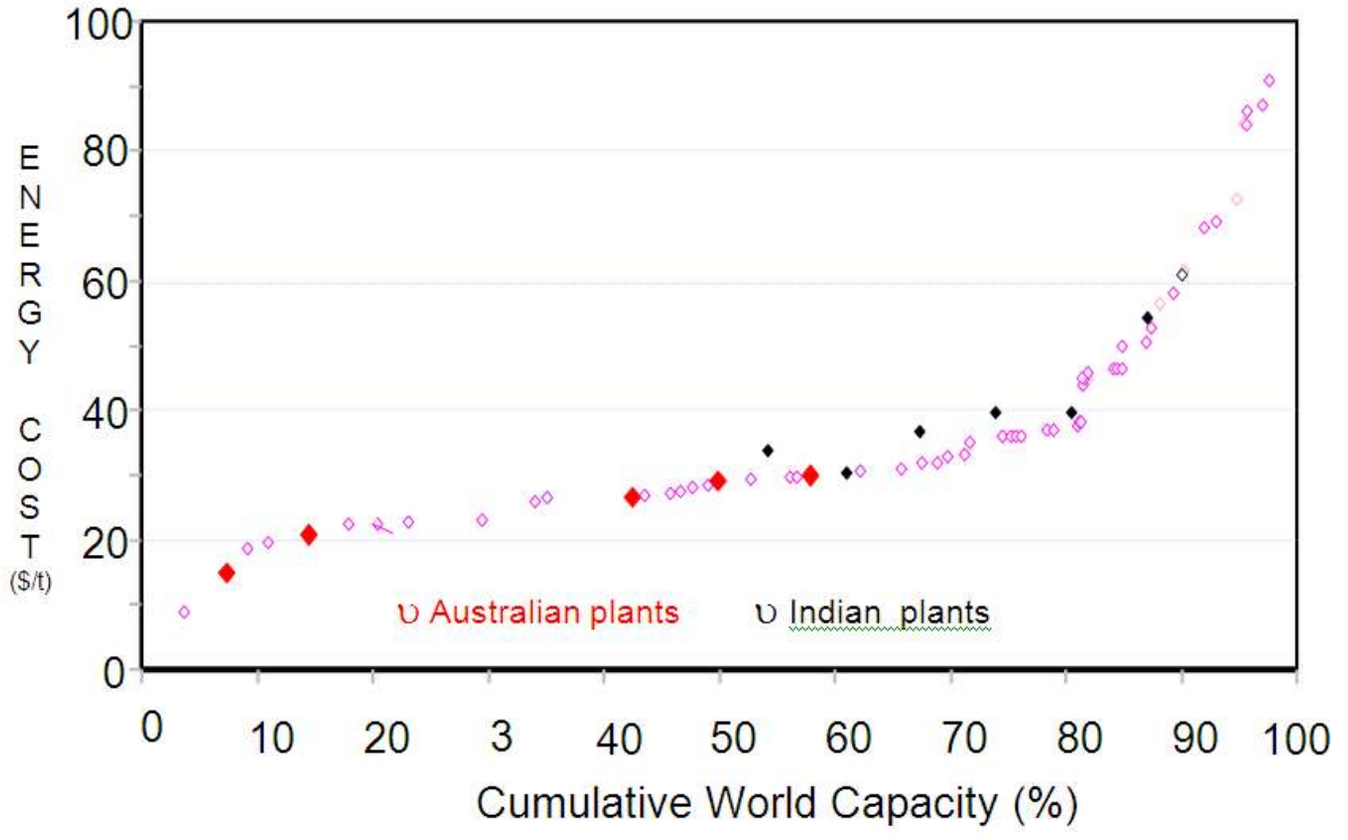
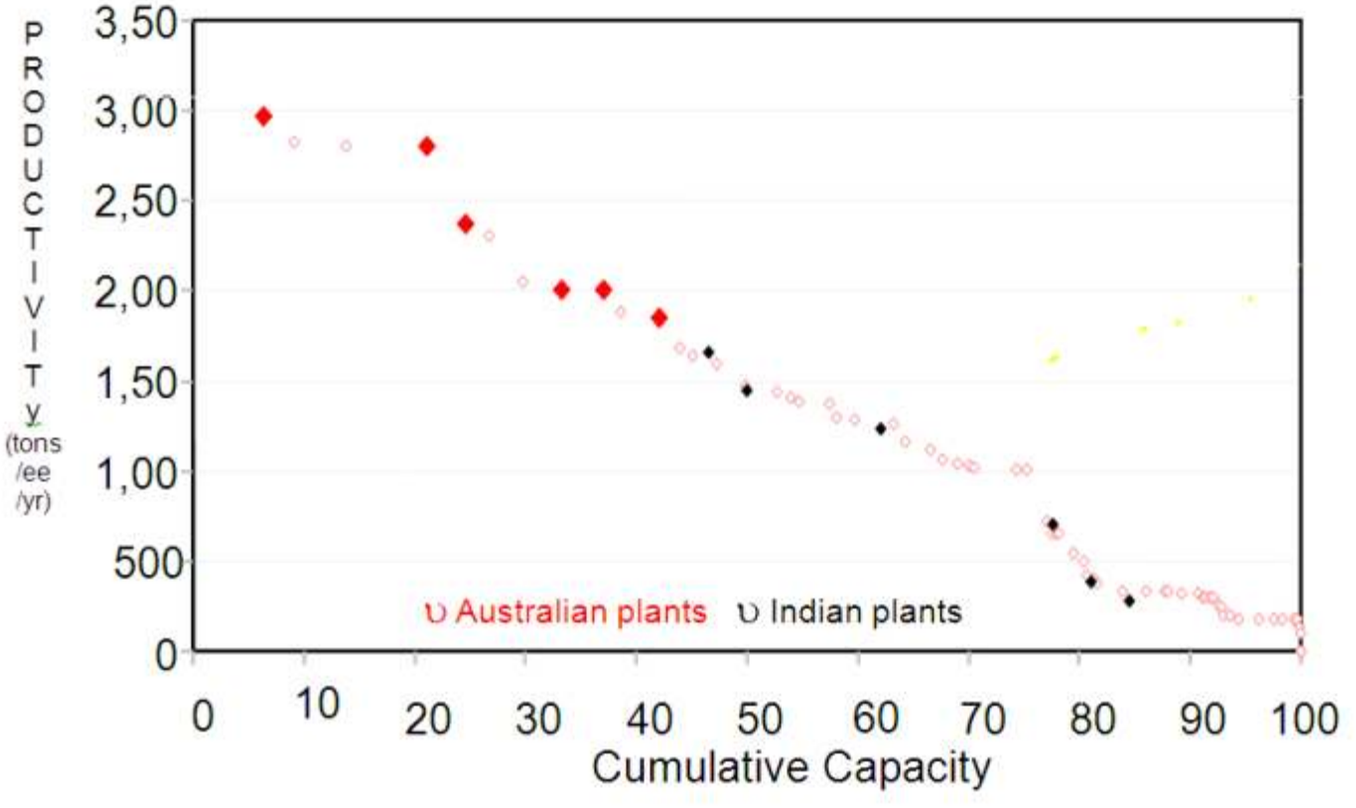
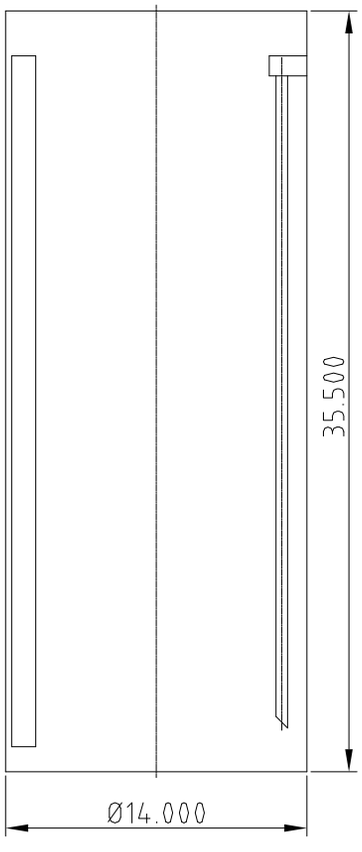


Fig. 7: Comparison of Productivity



STC-Engineering GmbH, Germany
Detlef Klatt

In the following some design aspects of the two main applications for agitators in an alumina refinery will be described – precipitator and desilicator. Both units are demanding with respect to mixing performance, as the solids concentration is quite high and one has to achieve a uniform solids concentration over the complete vessel height. The design of both agitators has to consider a sufficient speed and power input to generate a uniform mixing but on the other hand a tip speed limit of the impellers to avoid grain size destruction and erosion at the impeller tips has also to be taken into account.



Example data for a precipitator:

Suspension density max. 1720 kg/m³

Solids content in suspension: 700-1000 g/l

Solids density: 2450 kg/m³

Mother liquor density: 1299 kg/m³

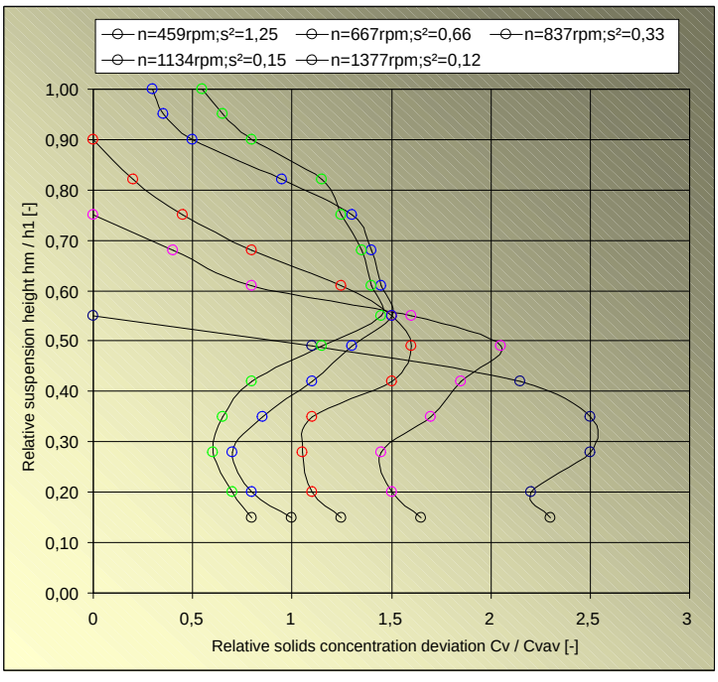
dK80= 120 µm

STC did a lot of research in this field to create solutions fitting to both demands.

Research

I.) Solids concentration deviation above tank bottom related to speed

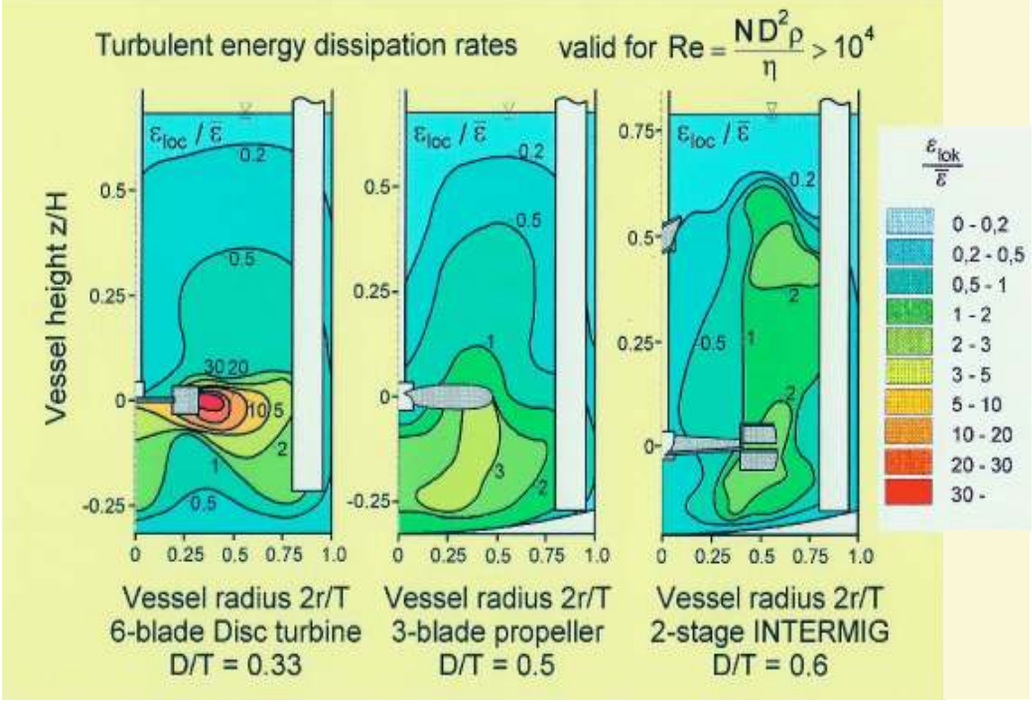
In this graph, taken from laboratory research, one can see, that the solids concentration deviation over the vessel height depends strongly on shaft speed and impeller system as well as suspension properties. This function has to be found by research for each impeller system and slurry properties individually.



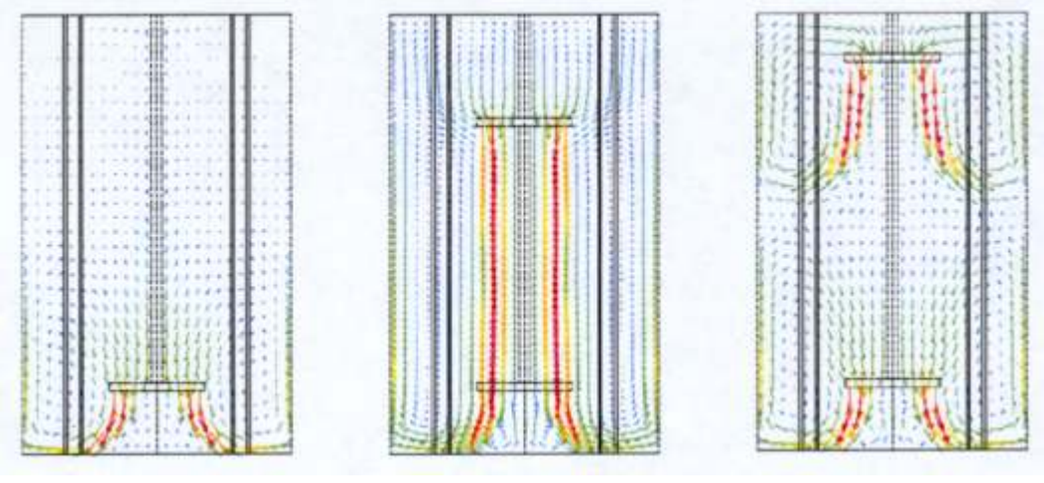
Conclusion: Higher impeller speed results in better solids distribution

I.) Uniform power input – turbulent energy dissipation rates

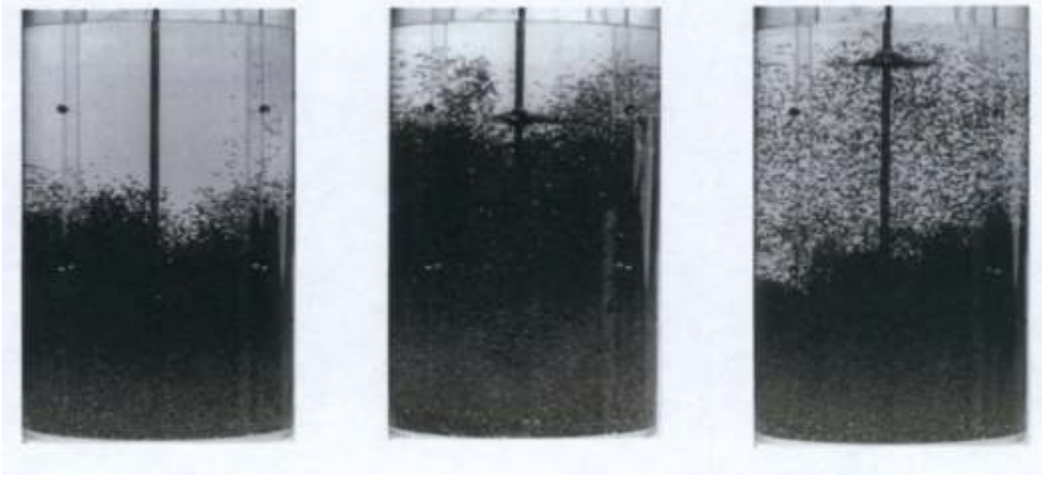
The local power input around an impeller blade and the power distribution in terms of energy dissipation throughout the vessel is different for different impeller types. These research results show, that for a uniform power dissipation throughout the vessel, a multi stage arrangement is the most suitable solution. Besides a reduced fluctuation rate and therefore less local shear, contributing to less wear and less grain distraction, an overall lower power input is required, for the same suspension quality.



Experimental visualization shows also here that CFD calculations come very close to reality. Like before already stated, impeller stage distances must be kept close enough to achieve the transport of solids over the filling height, and avoid the flow to be separated. Further it is visible that for homogeneous suspending up to as far as possible to the liquid surface more stages are required as the 2 in this example.



CFD simulated flow characteristics of a single-stage and two stage agitating system



Experimental visualization of the CFD simulation

Conclusion: A multistage impeller arrangement with an optimized impeller stage distance, is required to transport the solids from stage to stage uniform from bottom to top.

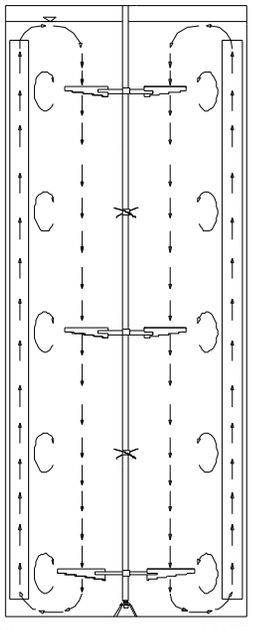
STC did a lot of research in this field to create solutions fitting to both demands.

Research

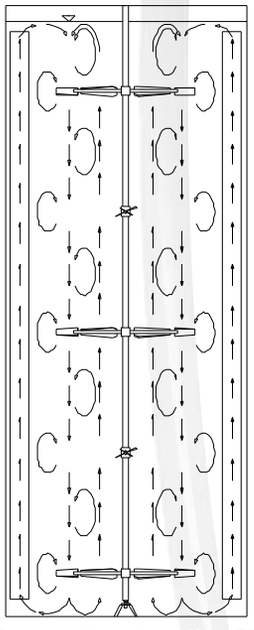
I.) Solids concentration deviation above tank bottom related to speed

In this graph, taken from laboratory research, one can see, that the solids concentration deviation over the vessel height depends strongly on shaft speed and impeller system as well as suspension properties. This function has to be found by research for each impeller system and slurry properties individually.

I.) Flow characteristic of two different impeller types



Hydrofoil impeller VHFI



Counter flow impeller CFI

The hydrofoil impeller forms vortexes in one direction only where the counter flow impeller generates vortexes into two directions. Based on the same impeller speed and same diameter the transport of the solids from one impeller stage to the other is therefore significantly better for the counter flow impeller. Consequently this means, to achieve the same solids distribution with the hydrofoil impeller arrangement one has to operate at higher impeller speed.

Conclusion: Hydrofoil impellers need higher speeds than counter flow impellers to achieve the same solids distribution.

I.) Erosion of impellers by particle impact

Wear rate

$W = f(Ep, Hp, HG, cG, dK80, ...) * v^3$

Ep – Young modulus of impeller material

Hp – Hardness of impeller

Hp – Hardness of grains

cG – Solids concentration

dK80 Grain size

v - Tip speed

The wear rate depends on different factors where the main factor is the tip speed of the impeller.

The tip speed influences the wear rate by the cube.

Conclusion: Higher impeller speed increases the wear rate at the impeller tips.

Bauxite mine capacity
Data compiled by ALCOR

Mines

	Location	Country	Company	Capacity Mt/year	Remarks
1	Awaso	Ghana	Ghana Bauxite Company Ltd (GBC)	0.7	
2	Boke	Guinea	Cie des Bauxites De Guinee (CBG)	13.5	
3	Fria	Guinea	Alumina Company of Guinea (ACG)	2.1	
4	Kindia	Guinea	Compagnie Des Bauxites De Kindia (CBK)	3.0	
5	Gondama	Sierra Leone	Sierra Mineral Holdings Ltd	1.1	
6	Pocos de Caldas - CBA	Brazil	Companhia Brasileira de Alumínio(CBA)	1.2	
7	Itamarati De Minas	Brazil	Companhia Brasileira de Alumínio(CBA)	1.8	
8	Paragominas	Brazil	Mineração Bauxita de Paragominas	5.5	
9	Pocos de Caldas - Alcominas	Brazil	Alcominas	1.1	
10	Trombetas	Brazil	Mineração Rio do Norte (MRN)	18.0	
11	Kwakwani	Guyana	Aroaima Bauxite Co	1.0	
12	Linden	Guyana	Omai Bauxite Mining Inc (OMBI)	0.6	
13	Manchester Plateau	Jamaica	Alpart	4.5	Closed
14	Mount Oliphant	Jamaica	Jamalco	3.4	

15	Blue Mountain	Jamaica	West Indies Alumina Company (Windalco)	2.0	Closed
16	Schwallenburgh	Jamaica	West Indies Alumina Company (Windalco)	2.3	Closed
17	Port Rhoades	Jamaica	St Ann Bauxite Ltd	5.0	
18	Coermotibo	Suriname	BHP Billiton Suriname	2.6	
19	Kaaimangrassie & Caramacca	Suriname	BHP Billiton Suriname	1.5	
20	Klaverblad	Suriname	BHP Billiton Suriname	1.4	
21	Los Pijiguaos	Venezuela	CVG - Bauxilum	7.3	
22	Bose Mine	China	Guangxi Huayin Al Cy	3.0	
23	Diangjiang Mine	China	Wanji Aluminium	1.0	
24	Gao Qiao	China	East Hope (Sanmenxia) Mining Company, Ltd.	4.9	
25	Gongyi	China	Great Wall Aluminium Corporation	2.7	
26	Jiaokou Mine	China	Jiaokou Al Cy	2.1	
27	Jingxi Mine	China	Xinfa Aluminium & Electrical Group	3.0	
28	Kaili Mine	China	Kaili Alumina Plant	0.1	
29	Nanchuan Bosai	China	Bosai Minerals Group Co Ltd	0.5	
30	Nanding	China	Shandong Al Smelter	0.5	
31	Pingdingshan	China	Ruzhou Al Co (Shenhuo)	0.7	
32	Pingguo	China	Pingguo Al Cy	4.1	
33	Pìnglu Mine	China	Wusheng Aluminium Co	0.4	
34	Sanmenxia	China	Jinjiang Shanxian Mining Co	2.4	
35	Showgwan	China	Great Wall Aluminium Corporation	3.1	
36	Wachangping	China	Guizhou Wuchuan Zijin Mineral Resources Cy	0.5	
37	Wulong	China	Chongqing Dingtai Energy Group	0.4	
38	Xiaoyi	China	Shanxi Alumina Plant	2.9	

39	Xiuwen	China	Guizhou Alumina Plant	3.0	
40	Yangquan Mine	China	Yangquan Coal Industry Group	1.1	
41	Yimei Mine	China	Yixiang (Yichiang) Al Co	0.4	
42	Yuanping Mine	China	Luneng Jin Bei Al Co	2.7	
43	Zhongmei Mine	China	Zhongmei Al Cy	1.0	
44	Zaglik	Azerbaijan	Zaglik Alunite Mining Directorate	0.0	Closed
45	Bodai-Daldali	India	Bharat Aluminium Co (Balco)	0.1	
46	Chandgad	India	Hindustan Aluminium Co. (Hindalco)	1.1	
47	Jamnagar	India	Ashapura Minechem Ltd	0.9	
48	Jharkhand	India	Hindustan Aluminium Co. (Hindalco)	1.8	
49	Kolli Hills	India	Madras Aluminium Company (Malco)	0.2	Closed
50	Lohardaga	India	Hindustan Aluminium Co. (Hindalco)	0.3	
58	Mainpat	India	Bharat Aluminium Co (Balco)	0.6	
51	Panchpatmali	India	National Aluminium Co. (Nalco)	4.8	
51	Raigarh	India	Ashapura Minechem Ltd	3.5	
53	Yercaud	India	Madras Aluminium Company (Malco)	0.2	Closed
54	Bintan	Indonesia	Aneka Tambang	1.4	
55	Tangerang	Indonesia	Pt Harita Prima Abadi Mineral	7.0	
56	Zargah	Iran	Iralco	0.5	
57	Arkalyk	Kazakhstan	Alyumini Kazakhstan	0.7	
58	Lisakovsk	Kazakhstan	Alyumini Kazakhstan	4.4	
59	Mortas Konya	Turkey	Etibank Aluminyum Isletmesi	0.5	
60	Baoloc	Vietnam	Bao Loc Bauxite Mining	0.0	
61	Distomon	Greece	Delfi-Distomon Bauxite S.A.	0.9	

62	Itea		Greece		Silver & Barite (S&B)	1.0
63	Olmedo		Italia		Sardabauxiti Spa	0.3
64	Vlasenica		Bosnia		Rudnici Boksita Jajce	1.4
65	Fenyofo		Hungary		Bakonyi Bauxit Banya Kft	0.5
66	Niksic		Montenegro		Rudnici Boksita Niksic	0.5
67	Kiya Shaltyrsk		Russia		Achinsk Glinozem Kombinat	5.3
68	Severo-Onezhsk		Russia		Severo-Onezhsk Boksit Ruda (SOBR)	0.6
69	Severo-Uralsk		Russia		Sever-Uralsk Boksit Ruda (SUBR)	3.3
70	Shredne-Timan		Russia		Shredne-Timansk Boksit Ruda (STBR)	2.2
71	Boddington		Australia		Worsley Alumina Pty Ltd (WAPL)	14.2
72	Gove		Australia		Nabalco Pty Ltd	8.9
73	Huntly		Australia		Alcoa of Australia	25.1
74	Weipa / Ely		Australia		Rio Tinto Alcan	19.4
75	Willowdale		Australia		Alcoa of Australia	10.2
76	**World Total**					**242**

Alumina refinery capacity
Data compiled by Alcor.

Refineries

	Location	Country	Company Name	Capacity kt/year	Remarks
1	Fria	Guinea	Alumina Company of Guinea (ACG)	660	
2	Jonquière	Canada	Alcan	1,600	
3	Corpus Christi	U.S.A.	Sherwin Alumina	1,600	
4	Gramercy	U.S.A.	Gramercy Alumina LLC	1,200	
5	Point Comfort	U.S.A.	Alcoa	2,300	
6	Aluminio	Brazil	Companhia Brasileira de Alumínio (CBA)	940	
7	Barcarena	Brazil	Alunorte	6,300	
8	Pocos de Caldas	Brazil	Alcominas	400	
9	Sao Luiz	Brazil	Alumar	1,400	
10	Ewarton	Jamaica	West Indies Alumina Company (Windalco)	650	Closed
11	Kirkvine	Jamaica	West Indies Alumina Company (Windalco)	560	Closed
12	Nain	Jamaica	Alpart	1,600	Closed
13	Woodside	Jamaica	Jamalco	1,420	
14	Paranam	Suriname	Suralco	2,200	
15	Ciudad Guayana	Venezuela	CVG - Bauxilum	2,000	
16	Binzhou	China	Lubei (Lu is Aluminium)	1,000	Closed
17	Chiping	China	Xinfa Huayu Alumina Cy	800	Closed

18	Debao	China	Guixi Huayin Al Cy	1,200	
19	Dengfeng	China	Zhongmei Al Cy	400	
20	Guiyang	China	Guizhou Alumina Plant	1,200	
21	Hejin	China	Shanxi Alumina Plant	2,200	
22	Jiaokou	China	Jiaokou Al Cy	800	
23	Jingxi	China	Xinfa Huayu Alumina Cy	1,200	
24	Kaili	China	Kaisheng Aluminium Cy	50	
25	Longkou	China	Longkou Donghai Al Cy	3,000	
26	Nanchuan - Bosai	China	Nanchuan Al Cy	200	
27	Pingdingshan	China	Huiyuan Al Cy	300	
28	Pingguo	China	Pingguo Al Cy	1,800	
29	Pinglu	China	Wusheng Al Cy	300	
30	Sanmenxia - Kaiman	China	Kaiman Aluminium Cy	1,000	
31	Sanmenxia - East Hope	China	East Hope Al Cy	2,000	
32	Wulong	China	Yuneng Metallurgical Group	150	
33	Xiangjiang	China	Xiangjiang Wanji Al Cy	800	
34	Yangquan	China	Yangquan Alumina Plant	400	
35	Yimei	China	Yixiang Al Ind Cy	200	
36	Yuanping	China	Luneng Jin Bei Al Cy	1,000	
37	Zhengzhou	China	Zhengzhou Alumina Plant	2,300	
38	Zhongzhou	China	Zhongzhou Alumina Plant	1,900	
39	Zibo	China	Shandong Aluminium Industry Cy	1,500	
40	Zouping	China	Weiqiao Aluminium & Electricity Cy	4,000	Closed
41	Kikumoto	Japan	Sumitomo	250	
42	Shimizu	Japan	Nippon Light Metals (NLM)	300	
43	Yokohama	Japan	Showa	300	
44	Mopko	South Korea	General Chemical Corporation	200	
45	Ganja	Azerbaijan	Kirovabad Am Works Kiraz	400	Closed

46	Ganja	Azerbaijan	Kirovabad Am Works Kiraz	400	Closed
47	Belgaum	India	Hindustan Aluminium Co. (Hindalco)	380	
48	Damanjodi	India	National Aluminium Co. (Nalco)	1,590	
49	Korba	India	Bharat Aluminium Co (Balco)	240	
50	Lanjigarh	India	Vedanta Alumina Ltd (VAL)	1,400	
51	Mettur	India	Madras Aluminium (Malco)	80	Closed
52	Muri	India	Hindustan Aluminium Co. (Hindalco)	440	
53	Renukoot	India	Hindustan Aluminium Co. (Hindalco)	700	
54	Jajarm	Iran	Iralco	280	
55	Pavlodar	Kazakhstan	Alyumini Kazakhstan	1,600	
56	Seydisehir	Turkey	Etibank Aluminyum Isletmesi	200	
57	Ho Chi Minh City	Vietnam	Tan Binh Chemical Factory	11	
58	Gardanne	France	Rio Tinto Alcan	630	
59	Stade	Germany	Aluminium Oxid Stade (AOS)	900	
60	Aghios Nikolaos	Greece	Alouminio tis Ellados	775	
61	Aughinish	Ireland	Rusal Aughinish	1,800	
62	Porto Vesme	Italia	Eurallumina	1,100	Closed
63	San Ciprian	Spain	Aluesa	1,500	
64	Zvornic	Bosnia	Birac Alumina Refinery	600	
65	Ajka	Hungary	Ajka Aluminiumapari Kft	320	
66	Podgorica	Montenegro	Kombinat Al Podgorica (KAP)	280	
67	Achinsk	Russia	Achinsk Glinozem Kombinat	1,100	
68	Boksitogorsk	Russia	Boksitogorsk Glinozem Zavod	100	
69	Kamensk-Uralsk	Russia	Uralsk Aluminium Zavod	700	
70	Krasnoturyinsk	Russia	Bogoslovsk Aluminium Zavod	1,100	
71	Nikolaev	Ukraine	Nikolaev Glinozem Zavod	1,400	

72	Zaporozhye	Ukraine	Zaporizhsky Alyuminievy Kombinat	260	Closed
73	Gladstone	Australia	Queensland Alumina Limited (Q.A.L.)	3,900	
74	Gove	Australia	Nabalco	3,700	
75	Kwinana	Australia	Alcoa of Australia	2,150	
76	Pinjarra	Australia	Alcoa of Australia	4,230	
77	Wagerup	Australia	Alcoa of Australia	2,600	
78	Worsley	Australia	Worsley Alumina Pty Ltd (WAPL)	3,600	
79	Yarwun	Australia	Rio Tinto Aluminium Yarwun	1,400	
80	**World Total**			**97,046**	

Aluminium smelter capacity
Data compiled by Alcor

Smelters

	Location	Country	Company Name	Capacity kt/year	Remarks
1	Edéa	Cameroon	Cie. Camerounaise de l'Aluminium (Alucam)	88	
2	Nag Hammadi	Egypt	The Aluminium Company of Egypt (Egyptalum)	240	
3	Tema	Ghana	Volta Aluminium Company Ltd. (Valco)	200	Closed
4	Maputo	Mozambique	Mozal	564	
5	Ikot Abasi	Nigeria	Aluminium Smelter Company of Nigeria Ltd (Alscon)	193	
6	Richards Bay-B	South Africa	Bayside	185	
7	Richards Bay-H	South Africa	Hillside	710	
8	Alma	Canada	Alcan	400	
9	Baie-Comeau	Canada	Alcoa	438	
10	Beauharnois	Canada	Alcan	50	Closed
11	Bécancour	Canada	Aluminerie de Becancour Inc (ABI)	410	
12	Deschambault	Canada	Aluminerie Lauralco Inc.	258	
13	Grande Baie	Canada	Alcan	200	
14	Jonquière	Canada	Alcan	161	
15	Kitimat	Canada	Alcan	280	
16	Laterrière	Canada	Alcan	220	
17	Sept-Iles	Canada	Aluminerie Alouette Inc.	575	
18	Shawinigan	Canada	Alcan	91	
19	Alcoa Tennessee	USA	Alcoa	214	
20	Badin	USA	Alcoa	120	
21	Bellingham/Ferndale	USA	Intalco Aluminum Corporation	300	
22	Columbia Falls	USA	Columbia Falls Aluminum Company (CFAC)	168	Closed
23	Evansville	USA	Alcoa	319	
24	Frederick	USA	Eastalco Aluminium Corporation	195	Closed

25	Hannibal	USA	Ormet Corporation	266	
26	Hawesville	USA	Century Aluminium Hawesville	244	
27	Massena - East	USA	Alcoa	130	Closed
28	Massena - West	USA	Alcoa	125	
29	Mount Holly	USA	Goose Creek	225	
30	New Madrid	USA	Noranda Aluminum Holding Corporation	253	
31	Ravenswood	USA	Century Aluminum of West Virginia, Inc.	170	Closed
32	Rockdale	USA	Alcoa	264	Closed
33	Sebree	USA	Alcan	196	
34	Wenatchee	USA	Alcoa	100	
35	Puerto Madryn	Argentina	Aluminio Argentino SAIC (Aluar)	410	
36	Aluminio	Brazil	Companhia Brasileira de Alumínio SA (CBA)	465	
37	Aratu	Brazil	Novelis	43	
38	Barcarena	Brazil	Aluminio Brasileiro SA (Albras)	455	
39	Pocos de Caldas	Brazil	Alcominas	96	
40	Santa Cruz	Brazil	Valesul Aluminio SA	95	Closed
41	Sao Luiz	Brazil	Aluminio do Maranhao (Alumar)	455	
42	Saramenha	Brazil	Novelis	52	
43	Puerto Ordaz-A	Venezuela	Aluminio del Caroni SA (Alcasa)	210	
44	Puerto Ordaz-V	Venezuela	Industria Venezolana de Aluminio (Venalum)	437	
45	Aba	China	Bosai Aba Aluminium	150	
46	Anlu Shi	China	Anlu Shi Al Co	22	
47	Bailianhe	China	Bailianhe Al Co	5	
48	Baiyin	China	Baiyin Al Co	150	
49	Balding	China	Balding Al Co	21	
50	Baoding Shi	China	Baoding Shi Al Co	7	
51	Baotou	China	Baotou Al Co	200	
52	BAOTOU	China	East Hope	450	
53	Changsha Shi	China	Changsha Shi Al Co	7	
54	Chizhou Xian	China	Chizhou Xian Al Co	15	
55	Chongging Shi	China	Chongging Shi Al Co	12	
56	Chuangyuan	China	Chuangyuan Al Co., Ltd	100	
57	Danjiangkou	China	Hanjiang Danjiangkou	106	
58	Datong	China	Qinghai Aluminium Co Ltd	260	
59	Dongchuan	China	Dongchuan	5	
60	Eimeshan	China	Eimeshan	73	
61	Fukang	China	Fukang	2	
62	Fushun	China	Fushun Aluminium Co	150	
63	Ganzhou Shi	China	Ganzhou Shi	15	

64	Gongyi	China	Zhongfu Industrial Co Ltd	60	
65	Guangyuan Shi	China	Guangyuan Al Cy	150	
66	Guanlu	China	Shanxi Guanlu Co Ltd	110	
67	Guiyang	China	Guizhou Al Plant	400	
68	Haizhou	China	Haizhou	40	
69	Handan Shi	China	Handan Shi	10	
70	Hanzhong Shi	China	Hanzhong Shi	5	
71	Hebei	China	Hebei	16	
72	Hebin	China	Long Men Al Plant	130	
73	Hefei Shi	China	Hefei Shi	15	
74	Hejin	China	Long Men Al Plant	100	
75	Huangguoshu	China	Huangguoshu Aluminium	50	
76	Huanghe	China	Huanghe Al Co	75	
77	Huangzhou Shi	China	Huangzhou Shi	16	
78	Huasheng	China	Huasheng Jiangquan Al Co	220	
79	Huaxin	China	Huaxin Al Ind	270	
80	Hunjiang Shi	China	Hunjiang Shi	25	
81	Jiamusi Shi	China	Jiamusi Shi	11	
82	Jiangning	China	Jiangning	20	
83	Jiaozuo	China	Great Wall Al Co	50	
84	Jilin	China	Jilin	25	
85	Kaili	China	Kaili Al Cy	30	
86	Kunming Shi	China	Kunming Shi	130	
87	Lanjiang Shi	China	Lanjiang Shi	30	
88	Lanxi Xian	China	Lanxi Xian	25	
89	Lanzhou	China	Lanzhou Al Co Ltd	430	
90	Liancheng	China	Liancheng Al Plant	270	
91	Linzhou	China	Zhongfu Industrial Co Ltd	60	
92	Liupanshui	China	Liupanshui Aluminium	100	
93	Luoyang	China	Luoyang	8	
94	Nanning Shi	China	Nanning Shi	15	
95	Nanping Shi	China	Nanping Shi	32	
96	Nanshan	China	Nanshan Group Al Co Ltd	150	
97	Panshi Xian	China	Panshi Xian	40	
98	Panzhihua,	China	Ming Zhu	100	
99	Penggiao	China	Penggiao	15	
100	Pingguo	China	Pingguo Aluminium Co	135	
101	Pingxinag Shi	China	Pingxinag Shi	15	
102	Pingyin	China	Pingyin	32	
103	Qiaotou	China	Qinghai Qiaotou Power	300	
104	Qimingxing	China	Guangyuan Aostar	125	
105	Qimingxing	China	Meishann Qimingxing	250	
106	Qingtongxia	China	Qingtongxia Al Co	160	
107	Qingyang	China	Qingyang	15	

108	Quiatou	China	Quiatou Al Cy	200	
109	Quinghai	China	Quinghai	207	
110	Quzhou	China	Quzhou	241	
111	Renhua Xian	China	Renhua Xian	22	
112	Sanmenxia	China	Sanmenxia Tianyuan Al Co	120	
113	Shenhuo	China	Shenhuo Al & Electricity Co	166	
114	Shijiazhuang Shi	China	Shijiazhuang Shi	13	
115	Shilimoreng	China	Shilimoreng	10	
116	Suixi Xian	China	Suixi Xian	5	
117	Taiyuan Shi	China	Taiyuan Shi	30	
118	Tongchuan	China	Tongchuan Xinguang Al Co	105	
119	Tongren	China	Tongren	1	
120	Urumqi Shi	China	Urumqi Shi	30	
121	Wanfang	China	Jiaozuo Wangfang Al Co	272	
122	Wanji	China	Wanji Al Co Ltd	340	
123	Weiming	China	Weiming Aluminium	35	
124	Wenchuan Xian	China	Wenchuan Xian	10	
125	Wuhan Shi	China	Wuhan Shi	13	
126	Xian	China	Xian Al Plant	60	
127	Xiangxiang Shi	China	Xiangxiang Shi	13	
128	Xichuan	China	Xichuan	6	
129	Xiezhou	China	Xiezhou	60	
130	Xinfa	China	Xinfa Xiwang Al & Power	228	
131	Xuzhou Shi	China	Xuzhou Shi	15	
132	angquan Shi	China	Yangquan Shi	7	
133	Yangxin Xian	China	Yangxin Xian	9	
134	Yanji Shi	China	Yanji Shi	13	
135	Yichuan	China	Yugang Longquan Al Co	269	
136	Yizhou Xian	China	Yizhou Xian	14	
137	Yongan	China	Yongan Al Co	115	
138	Yongcheng Xian	China	Yongcheng Xian	60	
139	Yuncheng Shi	China	Yuncheng Shi	30	
140	Yungcheng Shanhe	China	Yungcheng Shanhe	65	
141	Yunnan	China	Yunnan Al Co	300	
142	Yuping	China	Yuping Aluminium	15	
143	haofeng Aluminium	China	Yuping	58	
144	Zhengzhou	China	Great Wall Al Co	50	
145	Zhongfu	China	Zhongfu Al Ind	160	
146	Zhongmai	China	Mianchi Zhongmai	85	
147	Zhongzhou	China	Great Wall Al Co	50	
148	Zibo	China	Shandong Aluminium Co	95	
159	Zunyi	China	Zunyi Al Cy	150	
150	Many Other Smelters	China		6,700	
151	Kambara	Japan	Nippon Light Metals Co. Ltd. (NLM)	20	

152	Tursunzade	Tadjikistan	Tajik Aluminium Company (Talco)	520	
153	Sumgait	Azerbaidjan	Sumgait Alyuminievi Zavod	30	
154	Manama	Bahrain	Aluminium Bahrain B.S.C. (ALBA)	872	
155	Angul	India	National Aluminium Co. (Nalco)	358	
156	Hirakud	India	Hindustan Aluminium Co. (Hindalco)	100	
157	Korba	India	Bharat Aluminium Co (Balco)	365	
158	Mettur	India	Madras Aluminium (Malco)	40	
159	Renukoot	India	Hindustan Aluminium Co. (Hindalco)	360	
160	Kuala Tanjung	Indonesia	P.T. Indonesia Asahan Aluminium (INALUM)	257	
161	Bandar Abbas	Iran	Almahdi	257	
162	Arak	Iran	Iranian Aluminium Company (IRALCO)	120	
163	Pavlodar	Kazakhstan	Alyumini Kazakhstan	125	
164	Sohar	Oman	Sohar Aluminum	350	
165	Seydisehir	Turkey	Etibank Aluminyum Isletmesi	65	
166	Jebel Ali	UAE	Dubai Aluminium Company Limited (DUBAL)	950	
167	Dunkerque	France	Aluminium Dunkerque	273	
168	St.J.Mauriennne	France	Pechiney	135	
169	Essen	Germany	Aluminium Essen GmbH	170	
170	Hamburg	Germany	Hamburger Aluminium Werke Gm bH (HAW)	130	
178	Neuss / Norf	Germany	Rheinwerk	220	
171	Voerde	Germany	Hoogovens Aluminium Huttenwerk GmbH	92	
172	Aghios Nikolaos	Greece	Alouminio tis Ellados	165	
173	Grundartangi	Iceland	Nordic Aluminium (Nordural)	220	
174	Reydarfjordur	Iceland	Alcoa Fjardaál	342	
175	Straumsvik	Iceland	Icelandic Aluminium Co. Ltd. (ISAL)	182	
176	Fusina	Italy	Alumix SpA	44	
177	Porto Vesme	Italy	Sardal SpA	149	
178	Delfzijl	Netherlands	Auminium Delfzijl (Aldel)	100	
179	Vlissingen	Netherlands	Zeeland Aluminium Company	240	
180	Ardal	Norway	Hydro Aluminium	150	
181	Hoyanger	Norway	Hydro Aluminium	50	
182	Husnes	Norway	Sor-Norge Aluminium (Soral)	180	
183	Karmoy	Norway	Hydro Aluminium	170	
184	Lista	Norway	Elkem Aluminium	93	
185	Mosjoen	Norway	Elkem Aluminium	189	
186	Sunndalsora	Norway	Hydro Aluminium	360	

187	Aviles	Spain	Industria Espanola de Aluminio (Inespal)	88	
188	La Coruna	Spain	Industria Espanola de Aluminio (Inespal)	84	
189	San Ciprian	Spain	Aluminio Espanola	221	
190	Sundsvall	Sweden	Kubikenborg Aluminium (Kubal)	102	
191	Anglesey	UK	Anglesey Aluminium Metal Ltd.	145	Closed
192	Lochaber	UK	British Alcan Aluminium Plc	42	
193	Lynemouth	UK	British Alcan Lynemouth Ltd.	175	
194	Mostar	Bosnia	Aluminijcki Kombinat Mostar	130	
195	Podgorica	Montenegro	Kombinat Al Podgorica (KAP)	120	
196	Konin	Poland	Huta Aluminium Konin S.A.	55	Closed
197	Slatina	Romania	Aluminium Enterprise Slatina (Alro)	288	
198	Bratsk	Russia	Bratsky Alyuminievi Zavod	983	
199	Irkutsk	Russia	Irkutsky Alyuminievi Zavod	464	
200	Kamensk- Uralsk	Russia	Kandalaksha Alyuminievi Zavod	132	
201	Kandalaksha	Russia	Uralsky Alyuminievi Zavod	72	
202	Khakas	Russia	Khakasky Alyuminievi Zavod	300	
203	Krasnoturyinsk	Russia	Bogoslovsky Alyuminievi Zavod	183	
204	Krasnoyarsk	Russia	Krasnoyarsky Alyuminievi Zavod	950	
205	Nadvoitsy	Russia	Nadvoitsy Alyuminievi Zavod	78	
206	Novokuznetsk	Russia	Novokuznetsky Alyuminievi Zavod	317	
207	Sayanogorsk	Russia	Sayansky Alyuminievi Zavod	531	
208	Volgograd	Russia	Volgogradsky Alyuminievi Zavod	156	
209	Volkhov	Russia	Volkovsky Aluminium Zavod - VAZ	23	
210	Ziar Nad Hronom	Slovakia	Slovalco	177	
211	Kidricevo	Slovenia	Talum	117	
212	Zaporozhye	Ukraine	Zaporizhsky Alyuminievy Kombinat (ZALK)	115	
213	Bell Bay	Australia	Comalco	178	
214	Boyne Island	Australia	Boyne Smelters Ltd	555	
215	Kurri Kurri	Australia	Hydro Aluminium	164	
216	Point Henry	Australia	Alcoa of Australia	185	
217	Portland	Australia	Portland Aluminium	355	
218	Tomago	Australia	Tomago Aluminium Company Pty Ltd	510	
219	Tiwai Point	New Zealand	New Zealand Aluminium Smelters Ltd (NZAS)	355	
220	**World Total**			**44,524**	

Aluminum History And Metallurgy

The present volume is a collection of selected papers published by the author. They are reproduced here in facsimile edition arranged under the headings: The Pioneers, Metallurgy, and Selected Topics. In the last section a paper on the position of aluminum in the Periodic Table is included another on gallium since it is mainly produced as a by-product of the aluminum industry, and the history of aluminum as illustrated on postage stamps. Also included are selected chapters on the chemistry of aluminum and some of its compounds. The collection gives a rapid and fully illustrated review of the history and extractive metallurgy of aluminum. 160 pages, $ 40 + Postage. ISBN 2-922686-12-4.

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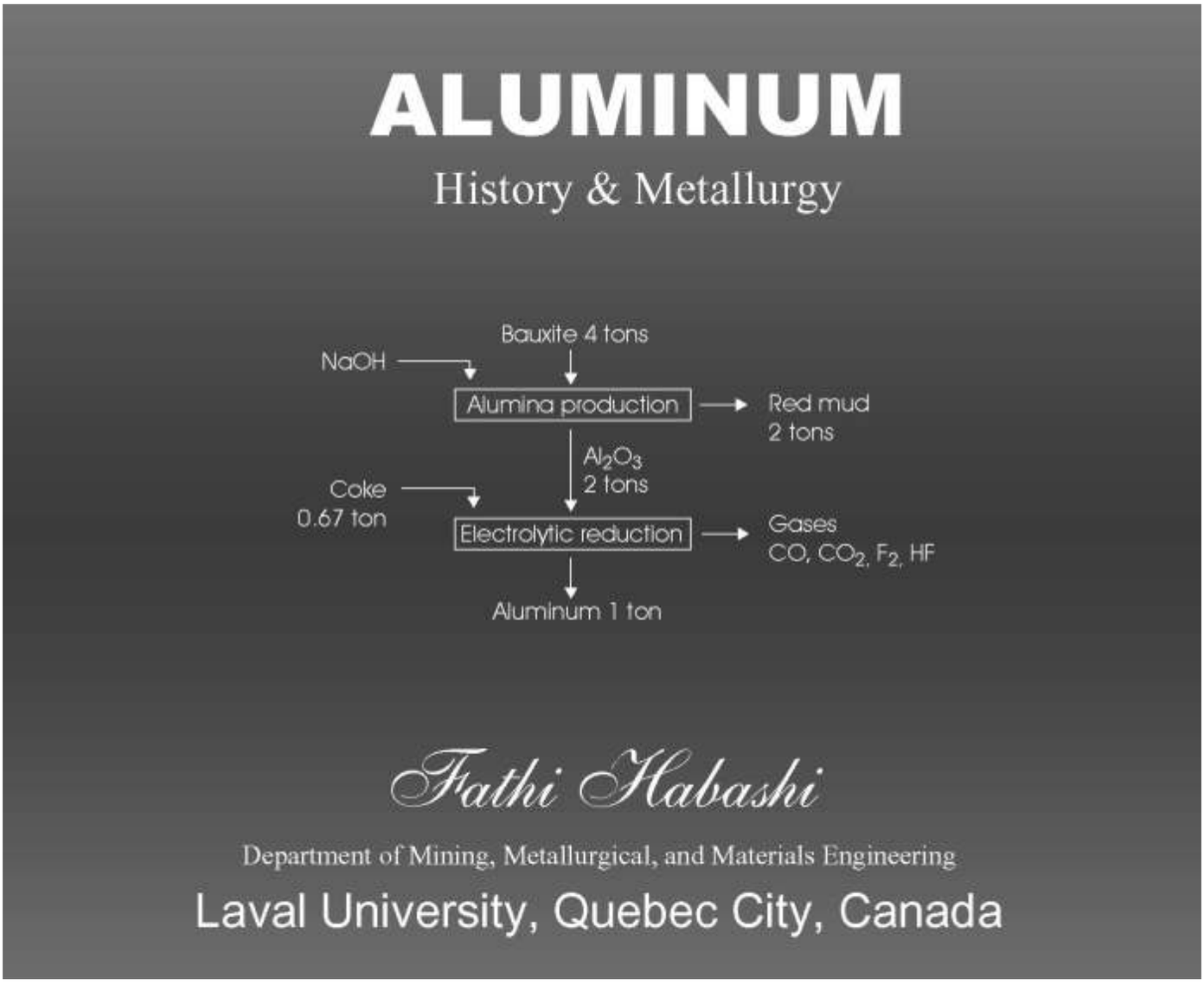

APPROVED STATUTES OF ICSOBA

Article 1

The organisation bears the name International Committee for the Study Of Bauxite, Alumina and Aluminium (in the following ICSOBA) which is a non-profit organization (This name is effective from 1969). The organisation was established at the Yugoslav, now Croatian Academy of Sciences and Arts, Zagreb, Croatia in 1963 under the name "Comite International pour l'Etude des Bauxites des Oxydes et Hydroxides d'Aluminium". The seat of the Council of the ICSOBA is at the Croatian Academy of sciences and Arts, Zrinski trg 11, 41000 Zagreb, Croatia

The seat of the Secretariat of the ICSOBA was located in Zagreb at the Academy between 1963 and 1997, then in Budapest at the Hungarian Mining and Metallurgical Society (OMBKE) between 1997 and 2008, and presently at the Mineral Information and Development Centre (MIDC), A/5, Rajat Utsav II, Kachimet, Amravati Road Nagpur 440033, India. The technical periodical of the organisation, TRAVAUX de l'ICSOBA was founded and mostly published by the Academy of Zagreb. The publishing activities will now be shifted to the ICSOBA Secretariat at Nagpur.

Article 2

The task of the ICSOBA is to stimulate, promote and encourage scientific and technological investigations and industrial development in the field of bauxite, alumina, aluminium production from primary and secondary sources and fabrication including environmental aspects of the industry and to promote the transfer and exchange of technologies among the geographical regions.

Article 3

The Committee fulfils its tasks:

a) by promoting and organising international and regional meetings, symposia, conferences and special workshops,

b) by collecting and publishing documentations with the objective of communicating it to its members,

c) by promoting collaboration in the field as mentioned in Article 2

Article 4

Members of the ICSOBA are as follows:

a) Individual members , that is persons taking an active role in the realization of the program of the ICSOBA

b) Collective members , that is companies, institutions such as universities, scientific research institutes, etc. which are represented in the ICSOBA by a delegate from each organisation

Article 5

The General Assembly is the leading body of the ICSOBA. It is composed of all personal members and delegates of collective members. The General Assembly elects the President, Vice Presidents and the members of the Council of the ICSOBA. It confirms the Secretary General (who is the Chairman of the Council) and confirms the Executive Director and Executive secretaries.

The President, the Vice President, the Secretary General (Chairman of the Council) and the members of the council are elected for a period of 4-5 years (until the next General Assembly) and they can be reelected.

Article 6

The ICSOBA is directed by the Presidency which is composed of:

a) the President,

b) the Past President,

c) the Vice Presidents,

d) the Secretary General,

e) the Executive Director

f) the Executive Secretaries.

Article 7

The Council of the ICSOBA supervises the activities of the Presidency. The Council is composed of the Secretary General who is the Chairman of the Council, nominated by the Croatian Academy of Sciences and Arts and 15 to 20 members representing one or more areas identified, as follows:

a) Technical Areas (Bauxite, Alumina, Aluminium, Fabrication, Environment)

b) Scientific Areas (Academies of Sciences, Universities, Scientific Institutions)

c) International Societies (IAI, EAA,TMS, AusIMM, CIM, CSM, IIM etc.)

d) Regional areas (Asia, CIS, Near East, etc.)

Article 8

The Executive Director together with the Executive Secretaries are nominated by the Mineral Information and Development Centre Nagpur and approved by the Council of ICSOBA.. The Executive Director manages the activity of ICSOBA together with the Executive Secretaries and Secretariat.

Article 9

The Functions of the Presidency and the Council are as follows:

a) The President is the official representative of ICSOBA in all official matters, developing the Strategy of the ICSOBA together with Past President, Vice Presidents, Secretary General, Executive Director and Executive Secretaries.

b) The Past President helps the activity of the President, maintains the continuation of the activities and represents the ICSOBA if necessary.

c) The Vice Presidents, Secretary General, Executive Director and Executive Secretaries help the President in his activity and represent ICSOBA in case the President is not in the position to do this.

d) The Secretary General leads the Council of the ICSOBA and is responsible for organising the meetings of the Council.

e) The Executive Secretaries are advisers to the Executive Direrctor and ensure the smooth functioniong of the Executive Directorate.

f) The Executive Director together with the Executive Secretaries is responsible for the day to day operations and for the financial management of ICSOBA together with the MIDC and prepares the annual budget to be approved by the Council. The Executive Director and the Executive Secretaries organize the activity of the Secretariat and contribute to organization of the international congresses and symposia and also to publishing of the related proceedings in the issues of the periodical “Travaux of ICSOBA” and holds liaison to the members.

g) The Council is the supervisory board of the ICSOBA and selects members to be proposed to the General Assembly for any function. It approves the long term strategy of the ICSOBA and the annual budget as well as any major events to be proposed by the Presidency.

Article 10

Financial sources of the activities of the ICSOBA:

• Individual membership fees,

• Collective membership fees (companies, institutions, societies),

•Voluntary contributions of the patron members,

•Revenues of congress, symposia, workshops, exhibitions,

•Publications and advertisements.

The budget of the ICSOBA is managed by the Mineral Information and Development Centre Nagpur. Audited financial report will be presented to and approved by the Council of ICSOBA each year and for the whole period presented and approved by the General Assembly.

Article 11

The Hungarian Mining and Metallurgical Society (OMBKE) founded in 1973 the ICSOBA Commemorative Medal with the aim to celebrate the memory of scientists who pioneered the way of the aluminium industry, as well as to emphasize the activity of the Hungarian Mining and Metallurgical Society in strengthening of ICSOBA and in promoting international scientific co-operation in aluminium manufacturing. The ICSOBA Commemorative Medal symbolizes the scientific contributions of Berthier, Bayer, Héroult and Hall to the aluminium industry. The ICSOBA Commemorative Medal may be awarded to those Hungarian or foreign members of ICSOBA who achieved significant scientific or practical results within the field of action of this international scientific society or who notably strengthened this organisation or promoted international scientific co-operation. The ICSOBA Commemorative Medal may be awarded to not more than three persons on the occasion of the ICSOBA Congress.

Article 12

The official language of the Committee is English.

Article 13

The Proceedings of the Congress and Symposia are published by the Organising Committee of the given international meeting in due time.

Article 14

Any modification of or addition to the statues should be decided by a two third majority of all members of the ICSOBA.

Article 15

The present Statues were accepted by the General Assembly of the ICSOBA held during the 10th Congress of the ICSOBA in Bhubaneswar on 30th November, 2008.

Secretary General President

Minutes of the General Assembly of ICSOBA, Bhubaneshwar

The ICSOBA General Assembly Meeting was held in The Mayfair Lagoon Hotel, Bhubaneswar on November 30, 2008 at 3.00 PM; the following Council Members were present:

Mr. Dimitri Contaroudas	President
Dr. G. Komolossy	Past President (also represented Dr. Karoly Solymar the Executive Director)
Dr. A.K. Nandi	Member

Discussion on various agenda items is summarized below:

Introductory Remarks

At the outset the President welcomed the members of the General Assembly and reviewed the activities of ICSOBA since its inception, concentrating on those in the recent past. Following important points were brought out:

·A symposium or Congress is held at least in alternate years and it is desirable to continue this practice in the future; the next symposium can be planned for in 2010 with possible venue in China.

·There is a proposal to move the ICSOBA Executive Directorate to India; the proposed seat is the Mineral Information and Development Centre Nagpur.

·Changes to be made to the ICSOBA statues in this regard were circulated to all the members of ICSOBA in the first week of November 2008, requesting them to offer their comments so that the matter can be taken up for discussion at the time of ICSOBA Congress in Bhubaneshwar in the last week of November 2008. All the comments received in response to the proposal for change were favorable for effecting the change.

Report of the Secretary General and Executive Director

On behalf of the Secretary General (Prof. Olga Lahodny Sarc) and Executive Director (Dr. K. Solymar), Dr. Komolossy presented the progress report (Annexure I).

Proposal to change the ICSOBA Statues

The President, Mr. Contaroudas and Dr. T.R. Ramachandran, (Retd.) Director of the Jawaharlal Nehru Aluminium Research Development and Design Centre Nagpur, India, introduced the topic. The following composition was agreed for the Presidency:

1.The President
2.The Past President
3.Vice Presidents (not more than 3) (as against 1 that is presently available
4. Secretary General
5. Executive Director
6.Executive Secretaries(2)

There will be a maximum of 20 Council Members. A copy of the approved statues is shown as Annexure II.

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Election of New ICSOBA Office Bearers

The following were elected as office bearers of ICSOBA.

Mr. C.R.Pradhan, Chairman-Managing Director, NALCO	President
Mr. Roelof Den Hond, Managing Director ALCOR	Vice President
Mr. R.P. Shah, Executive President and Chief Manufactuirng Officer HINDALCO	Vice President
Third Vice President position to be filled up based on the venue of the nex Symposium	
Prof. Olga Lahodny- Sarc, Croatian Academy of Arts and Sciences	Secretary General
Dr. T.R. Ramachandran (Retd.) Director JNARDDC Nagpur	Executive Dircetor
Dr. A.K. Nandi, MIDC Nagpur	Executive Secretary
Mr. H. Mahadevan, Hyderabad	Executive Secretary

Mr. Contaroudas would be in the Presidency as Past President

The tenure of the Office Bearers will be two years.

Proposed Activities of ICSOBA

· Organisation of periodic Symposia or Congress (timing to be fixed taking the Australian Alumina Quality Workshop dates into account)

· bringing out periodic issues of TRAVAUX of ICSOBA and a six monthly news letter including statistics and technical articles.

· To sustain these activities it is necessary to have the membership fee collected regularly; the membership rates are US$ 50 per annum for individual members and US$500 for Corporate Mmbers.

The General Assembly expressed its deep appreciation of the efforts of the Past Presidency in ensuring a high level of activity and wished the outgoing Executive Director, Dr. Solymar, good health and all success in his future activities.

The Meeting ended with a vote of thanks to the Chair.

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