

# AP Technology™

## AP30/AP40 The world's benchmark reduction technologies



*Alma*

### AP30/AP40 smelters: delivering big benefits

Currently operating above 400kA, our high amperage AP40 pots stand as the benchmark in reduction cell technology. Fully integrated into an optimised smelter design, AP40 technologies offer:

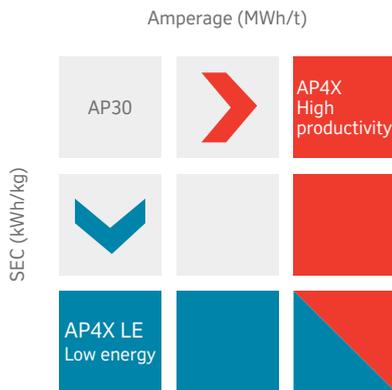
- Highest demonstrated amperage with development ongoing at Saint-Jean-de-Maurienne and under construction at Kitimat
- Lowest energy consumption (below 12,500kWh/t) following the development of AP40LE at Alouette and AP4X LE at Saint-Jean-de-Maurienne
- Lowest total cost of ownership with lowest combined capital and operating costs
- Industry's most bankable and dependable solution
- Most sustainable solution with the lowest energy consumption and GHG emissions, backed by our continuous improvement and innovation pipeline
- Unequalled productivity (above three tonnes/pot/day) and return on capital invested

Our advanced AP3X cell technologies deliver unmatched benefits to aluminium producers worldwide.



	Number of pots	
1	Alba	624
2	Alma	432
3	Alouette	594
4	Boyne	264
5	Deschambault	264
6	Dunkerque	264
7	Hillside	720
8	Mozal	576
9	Saint-Jean-de-Maurienne	120
10	Fjarmaal	336
11	Sohar	360
12	Ma'aden	720
	<b>Projects</b>	<b>Pots</b>
13	Hindalco – Aditya	360
14	Hindalco – Mahan	360
15	Helguvik	90
16	Kitimat	384

*The AP Technology™ solutions available today meet industry needs by enabling very high productivity or very low energy consumption.*



**Proven global track record**

Today more than six million tonnes of annual capacity are equipped with our innovative AP Technology™ cells. Our AP18 and AP30 solutions operate at amperages ranging from 180 to above 400kA. In 2011, 4,554 AP30 pots produced approximately 4.5 Mt of aluminium around the world or ten per cent of global production.

**Continuous improvement**

AP30 builds on more than three decades of intensive research and a steady flow of breakthroughs and enhancements. Continuous R&D will enable further amperage increases in the very near future, ensuring ongoing efficiency and productivity improvements in AP30 potlines.

Leading edge AP30 and AP40 technology features include:

- Design amperage above 400kA
- Creeping potential over design values
- Latest ALPSYS process control system including technical management of potlines
- Fully integrated alumina transport design including point feeding system and HyperDense Phase System (HDPS), automatic ALF3 and crushed bath feeding

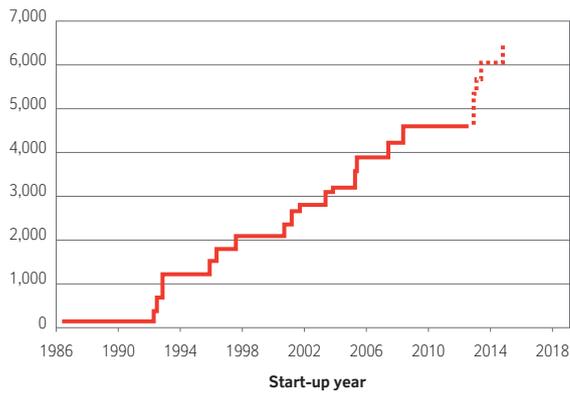
**Substantial savings**

The latest AP40 technology reduces capital investment and operation costs through:

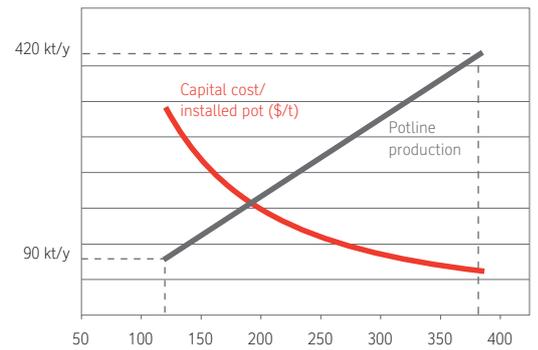
- Increased amperage over 400kA
- Specific consumption below 12,500 kWh/t
- Low anode effect rate below 0.03 per pot per day
- High potline equipment productivity – Increased number of pots per potline (above 400) – Reduced number of PTAs
- High environment, health and safety standards including electrical safety
- Improved building and equipment design
- Comprehensive engineering packages and training modules
- Experienced support teams at all project stages
- Reduced construction time and rapid start-up



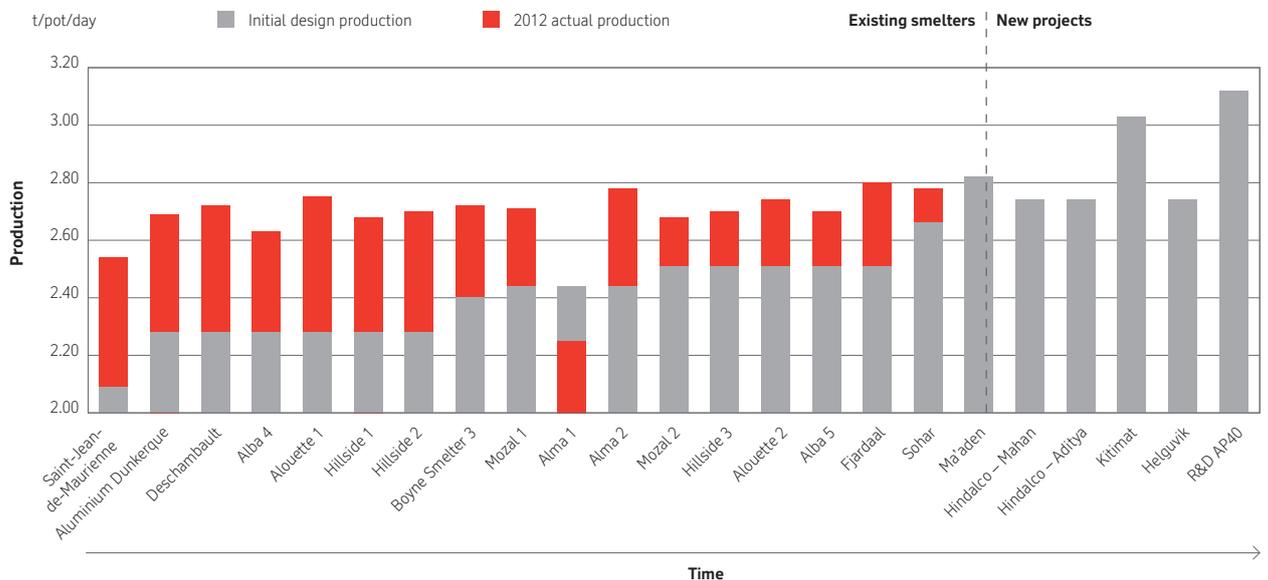
**Number of AP30 pots**



**Number of pots by potline**



**AP30 pot production increase (from older smelters to future projects and R&D potential)**



## Industry leading performance

Periods	Overall AP30	Mean results		Most productive AP30		Most energy efficient AP30		Kitimat basic data list – AP40
	1988 to Nov. 2012	2011	11 months 2012	2011	11 months 2012	2011	11 months 2012	
Number of potlines	17	17	17	1	1	1	1	1
Number of pots	4,554	4,554	4,554	360	336	330	330	384
Total production (kt)	52,187	4,453	3,737	373	315	308	285	420
Current (kA)	340	358	362	375	372	368	376	405
Current efficiency (%)	94.3	94.0	93.1	94.2	93.6	92.0	90.5	
kWh/t	13,336	13,385	13,463	13,798	13,334	12,683	12,839	13,150
Anode effects per pot and per day	0.20	0.22	0.24	0.14	0.12	0.18	0.18	
Iron content in the metal (ppm)	913	898	1,001	882	865	762	759	

### Potline retrofit

At Rio Tinto Alcan, we've participated in numerous pot modernisation projects. In each case, a complete assessment of existing pots is conducted to evaluate the potential gains including:

- Increased production and labour productivity
- Improved specific consumption (energy and raw materials)
- Enhanced environmental protection and working conditions

Leading edge AP Technology™ solutions are integrated into the modernisation process: potshell and lining, busbars, superstructure, anode system, alumina feeding, environmental protection, assistance to operation and, last but not least, the ALPSYS pot process control system.

### Industry leading performance

Since 1988, AP30 pots have produced more than 52 million tonnes of metal, confirming daily their reliability, robustness and performance. They're demonstrating the flexibility and full range of AP Technology™ solutions, from high productivity to low energy consumption.

### AP Technology™: the industry's leading reduction package

Pot technology is only one aspect of a smelter's performance. At Rio Tinto Alcan, we're committed to developing advanced smelter technology solutions that deliver exceptional performance and value today and in the future.

- Most comprehensive and advanced package
- Lowest full economic cost
- Unmatched industry and operating performance
- Most environmentally friendly technology
- Unrivalled credibility and unique bankability
- Extensive integrator experience

Technology sales department  
725, rue Aristide Bergès  
Centr'Alp - BP 7 -  
38341 Voreppe Cedex  
France

T +33 (0)4 76 57 85 00  
F +33 (0)4 76 56 61 10

[ap-technology.com](http://ap-technology.com)

Rio Tinto Alcan head office  
1188 Sherbrooke Street West  
Montreal, Quebec H3A 3G2  
Canada

T +1 514 848 8000  
F +1 514 848 8115

[riotintoalcan.com](http://riotintoalcan.com)

Mailing address  
PO Box 6090  
Montreal, Quebec H3C 3A7  
Canada

Production: [tmdesign.ca](http://tmdesign.ca)  
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