



Excellence through innovation

DUBAL reduction cell technologies

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dubal
Dubai Aluminium

Delivering more, without compromise

From its inception in 1979, Dubai Aluminium ("DUBAL") has been committed to continuous innovation in the aluminium smelting process so as to produce the world's best quality aluminium products, made to order and delivered direct to customers, while achieving maximum operating efficiencies. Substantial resources have been invested over the years in developing advanced electrolytic reduction cell technologies that not only increase productivity but also reduce the impact of smelter operations on the environment through improved energy efficiency and minimised emission levels.

This culminated in the development in 2005 of DUBAL's proven, in-house developed DX Technology — a UAE flagship technology that has been implemented in a dedicated 40-cell potline at DUBAL's Jebel Ali smelter complex. Over the first two years of operation, the amperage of these cells was successfully stepped up from 340 kA to 380 kA.

DX Technology has also been licensed to Emirates Aluminium Company Limited ("EMAL") and installed in the 756-cell, first phase of the greenfield EMAL smelter complex at Al Taweelah, Abu Dhabi, which was commissioned during 2010. Operating stably at 350 kA, the DX Technology cells at EMAL



Phase I gave the plant a nominal production capacity of 740,000 mt in 2011. The amperage of these DX Technology cells has since been increased to 353 kA, with performance levels surpassing projections.

Through ongoing research and development, DUBAL's DX Technology cells have been re-designed to enable operation at even higher amperages and optimized performance levels. Five new generation cells, built in the pilot line at Jebel Ali in 2010, initially operated at 420 kA and currently operate stably at 430 kA. Ultimately, DX+ Technology cells are expected to operate at 460 kA.

DX+ Technology has been specified for and will be licensed to EMAL Phase II, an expansion project involving the construction of 444-cells in a single potline.

More metal, more responsible profits

Operating stably at 380 kA plus, the DX Technology reduction cells at DUBAL offer several benchmark attributes that provide significant advantages, notably:

- Superb productivity of 2.87 mt Al/pot/day plus at exceptionally high purity levels of 99.92 per cent, giving rapid returns on capital expenditure; plus excellent creep potential, promising even better yields per pot.
- An energy-efficient design that enables specific energy consumption of 13.25 kWh/kg Al and 95.1 per cent current efficiency, together contributing to energy conservation and associated operating cost reductions.
- Reduced environmental impact through lower fossil fuel



consumption (a direct benefit of enhanced energy-efficiency) and reduced carbon consumption (anodes) of less than 0.408 kg C/kg Al. Moreover, DX Technology cells experience minimal anode effects (0.07 AE/pot/day), resulting in perfluorocarbon ("PFC") emissions of 0.015 CO₂ eq mt/mt Al.

- Fully engineered versatility — featuring proven magnetically efficient busbar configuration, anode configuration, superstructure, shell and lining designs, process controls and operational practices — allowing operating capability plus inherent potential for developing even higher amperage performance capacity.

DUBAL Reduction Technologies at a glance

	DX Technology (DUBAL Potline 8)	DX+ Technology (DUBAL Eagle pilot line) *
Amperage	380 kA	430 kA
Specific energy consumption	13.25 kWh/kg Al	13.17 kWh/kg Al
Current efficiency	95.1 per cent	95.0 per cent
Output	2.87 mt Al/pot/day	3.2 mt Al/pot/day
AE frequency	0.07/pot/day	0.15/pot/day
PFC emissions **	0.015 CO ₂ eq mt/mt Al	0.022 CO ₂ eq mt/mt Al
Carbon consumption	<0.408 kg C/kg Al	<0.408 kg C/kg Al
Aluminium purity	99.92 per cent	99.93 per cent

* Eagle pots actual specific results adjusted for EMAL Phase II design ** PFC is measured

New generation cells offer even more

DX+ Technology is based directly on the proven, inherently robust DX Technology. The industrial version is targeted to achieve specific energy consumption of less than 13.33 kWh/kg Al; current efficiency above 95 per cent; and an average yield per pot of 3.3 mt/day, with metal purity levels above 99.89 per cent. The AE frequency is very low but, more importantly, DUBAL's proprietary

advanced control logic restricts the average duration of AEs to less than 10 seconds (a world benchmark for lowering PFC emissions).

DX+ Technology offers similar advantages to DX Technology in terms of current efficiency, energy consumption and environmental performance indicators; as well as the added advantage of higher productivity at a lower capital cost per installed tonne of capacity.

A complete and sustainable solution

The cost/tonne to construct a smelter incorporating DX Technology is very competitive and even more competitive with DX+ Technology as compared to other technologies; while the construction period is also significantly short. Dependability, prolonged pot life and improved workforce output further contribute to reduced operating expenditure and thus lower total cost of ownership. These factors, together with the above-mentioned increased productivity, improved energy efficiency and reduced environmental impact, mean that the DX and DX+ Technologies provide truly sustainable solutions.

Importantly, DUBAL has the capability to supply complete end-to-end smelter solutions,

comprising advanced bankable technology, engineering, project development, long-term raw material supplies, a worldwide marketing and sales network, training and award-winning operational excellence. A comprehensive engineering package is provided as part of DUBAL's Technology Licence Agreement (comprising manuals, drawings, training, and so on) for both DX and DX+ Technologies; and experienced support teams are appointed to each project where DUBAL's technologies are deployed. This includes seconding specialists to the green-field site and dedicating DUBAL personnel to individual projects.

In addition, fully developed potline and pot management solutions based on DUBAL's innovative

pot control systems are installed with DX and DX+ Technology cells; thereby eliminating dependence on other technology suppliers to bring further capital- and operating expense benefits. The DUBAL pot control system can also be purchased independently, for retrofit to other pot technologies.



About DUBAL

DUBAL owns and operates one of the world's largest single-site primary aluminium smelters. Built on a 480-hectare site in Jebel Ali, Dubai, UAE, the complex's major facilities comprise a one million mtpa primary aluminium smelter, a 2,350 megawatt power station (at 30°C), a large carbon plant, casthouse operations, a 30 million gallon per day water desalination plant, laboratories, port and storage facilities.

The Jebel Ali site has the capacity to produce more than one million metric tonnes of high quality finished aluminium products a year, in three main forms: foundry alloy for automotive applications; extrusion billet for construction, industrial and transportation purposes; and high purity aluminium for the electronics and aerospace industries. DUBAL serves more than 300 customers in at least 45 countries around the world, predominantly in the Far East, Europe, the ASEAN region, the Middle East and Mediterranean region, and North America. The company holds ISO 9001, ISO/TS 16949, ISO/IEC 27001, ISO/IEC 20000, ISO 14001 and OHSAS 18001 certification; and has twice won the Dubai Quality Award in the Production and Manufacturing sector (1996 and 2000).

DUBAL also holds a 50 per cent share in the green-field Emirates Aluminium Company Limited ("EMAL") smelter development at Al Taweelah, Abu Dhabi; and has invested in joint venture projects in the bauxite/alumina sector in Brazil, Cameroon, India and Republic of Guinea.

Entirely state-owned, DUBAL is one of the largest non-oil contributors to the economy of Dubai and widely regarded as the industrial flagship of the UAE. Having begun to tap metal at Jebel Ali in November 1979, the company celebrated its 30th anniversary in 2009.

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