

## Amperage Increase from 340 kA to 425 kA in EGA DX Technology

Vinod Janardhanan Nair<sup>1</sup>, Vishal Ahmad<sup>2</sup>, Rawa Ba Raheem<sup>3</sup>, Ghalib Al Falasi<sup>4</sup>,  
Shaikha Al Shehhi<sup>5</sup>

1. Lead Engineer

2. Lead Engineer

3. Lead Engineer

4. Senior Manager, Potline Operations

5. Senior Manager, Potline Process Control,

Emirates Global Aluminium (EGA), Dubai and Abu Dhabi, United Arab Emirates.

Corresponding author: vinair@ega.ae

### Abstract

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Emirates Global Aluminium (EGA) has developed in-house DX Technology which is installed at EGA, Jebel Ali (44 demonstration cells in Potline 8) and Al Taweelah smelters (756 cells in Potlines 1 and 2). Jebel Ali Potline 8 was started in 2008 at 340 kA and reached 425 kA in February 2018. Al Taweelah Potlines 1 and 2 were started in 2010 to 2011 at 350 kA and are now operating at 422 kA. The AT Potlines 1 and 2 amperage increase to 388 kA and of Jebel Ali Potline 8 to 402 kA was already presented at ICSOBA 2015. This paper discusses further amperage increase to beyond 425 kA in DX Technology and different cell operation strategies, control system software improvements and cell design changes applied to minimize the thermal disturbances in the cells and optimize cell performance.

**Keywords:** DX Technology, EGA Al Taweelah smelter, amperage increase strategies, cell energy balance.

### 1. Introduction

EGA, Al Taweelah Potlines 1 and 2 (378 pots per potline) were started at 350 kA from December 2009 to January 2011 using DX Technology [1, 2]. Line amperage started to increase in May 2011 and reached 380 kA in October 2012 and stayed at this amperage until August 2014 in order to prove long term performance at this amperage (Figure 1) [3]. It was also considered that further amperage increase required a modification of the potshell to generation 2 (G2) design, which had been already installed and successfully demonstrated in the relined cells in Jebel Ali smelter, Potline 8 that was operating already at 400 kA at that time [4]. Potline 2 started the scheduled cell change-out process in April 2014 [5]. Accordingly, the new cells in both the DX potlines of EGA, Al Taweelah were installed with the newly equipped G2 design. Amperage was increased further to reach 388 kA in March 2015. By that time Jebel Ali DX Potline 8 had reached 402 kA.

By April 2016, EGA, Al Taweelah Potline 2 reached the operating amperage of 400 kA, while Potline 1 reached the same in July 2016. At that time Jebel Ali Potline 8 was already at 420 kA. Al Taweelah Potlines 1 and 2 reached another mile stone of 420 kA in December 2017. Currently both potlines are operating at 422 kA which was achieved in March 2018 whereas the demonstration Potline 8 in Jebel Ali smelter is operating at 425 kA, achieved in February 2018.

Figure 1 shows the different stages of amperage increase from start-up to end of September 2018 in Al Taweelah Potline 1 and 2 whereas Figure 2 shows the same for Jebel Ali Potline 8.

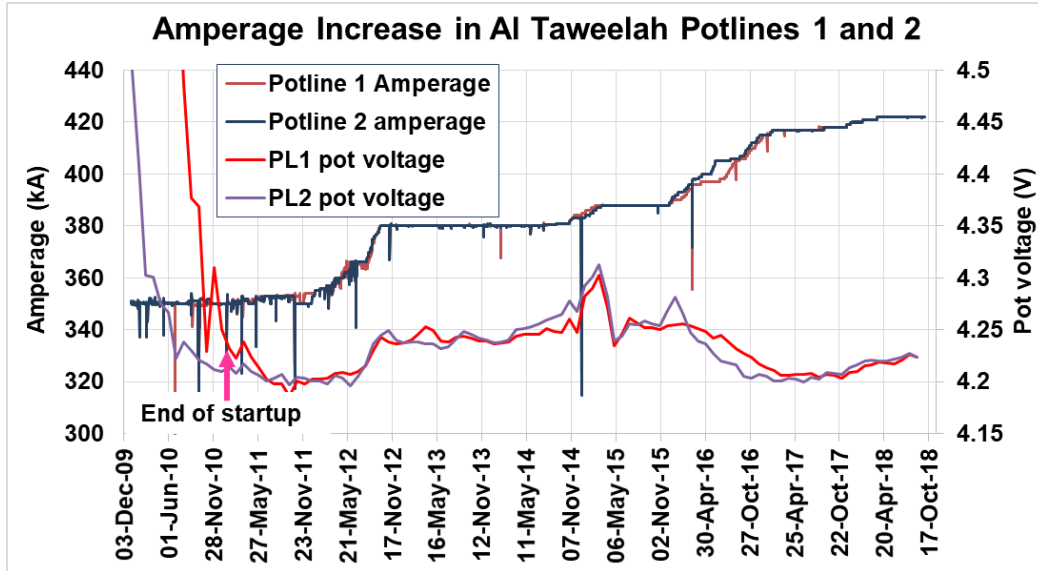


Figure 1. Amperage increase and cell net voltage in Al Taweelah Potlines 1 and 2 from 350 kA at startup to 422 kA at the end of September 2018.

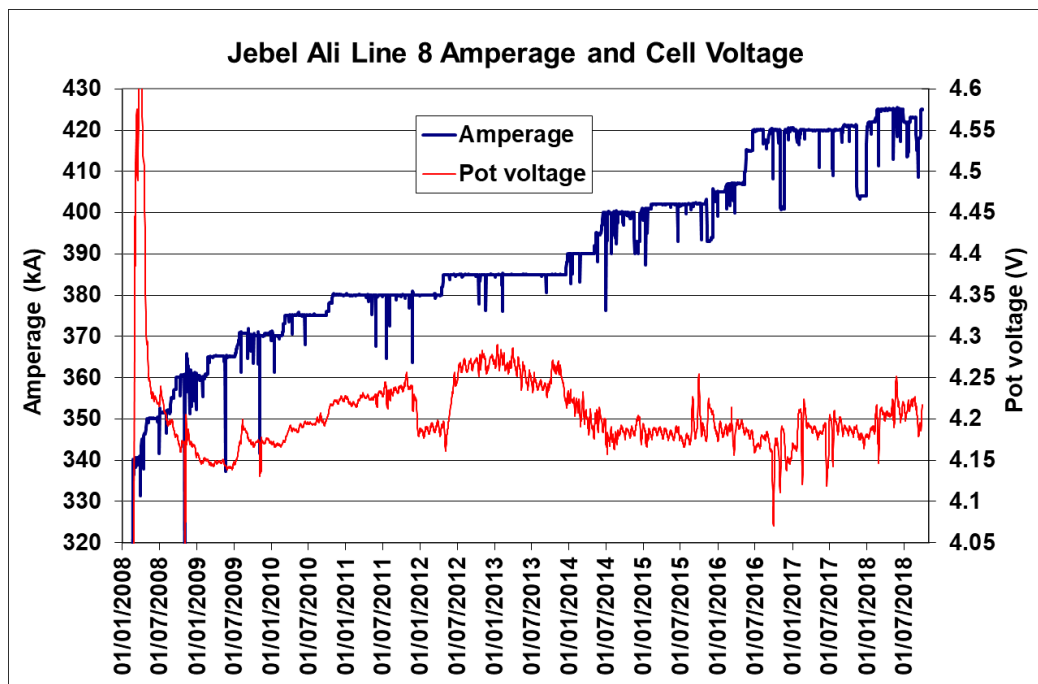


Figure 2. Amperage increase and cell voltage in Jebel Ali Potline 8 from start-up in March 2008 to 30 September 2018. Amperage data are daily, voltage data are 7-day running average from daily data.

2. Summary of Amperage Increase Milestones:

**EGA, Jebel Ali Potline 8:**

- March 2008: Potline started at 340 kA
- September 2008: Amperage reached 360 kA
- October 2010: Amperage reached 380 kA
- December 2013: Amperage reached 390 kA
- June 2014: Achieved a major milestone reaching 400 kA
- June 2016: Achieved another major milestone reaching 420 kA
- September 2017: Amperage increased to 421 kA
- February 2018: Achieved highest operating amperage for DX Technology at 425 kA.

**Table 2. Historical performance of Jebel Ali Potline 8.**

Parameter	Unit	2011	2012	2013	2014	2015	2016	2017	2018 (Jan-Sep)
Amperage	kA	379.8	383.4	385.1	395.2	401.3	413.1	417.9	423.0
Current efficiency	%	95.1	94.4	94.8	94.9	94.4	93.6	94.0	92.9
Metal production	kg/pot-d	2909	2916	2940	3021	3051	3113	3164	3164
Pot voltage	V	4.226	4.231	4.247	4.190	4.183	4.174	4.185	4.197
DC net specific energy consumption	kg/t Al	13.24	13.35	13.32	13.16	13.19	13.29	13.26	13.42
Net carbon cons.	kg/t Al	421	424	432	413	419	427	428	421
Gross carbon cons.	kg/t Al	540	527	556	532	511	525	530	538
Fe	%	0.043	0.052	0.063	0.051	0.039	0.048	0.056	0.061
Si	%	0.029	0.028	0.027	0.025	0.025	0.026	0.025	0.030
Bath temperature	°C	959	961	963	963	965	966	965	968
Excess AlF <sub>3</sub>	%	10.5	10.5	10.8	10.2	10.1	9.6	10.1	9.5
AE frequency	AE/pot-d	0.06	0.04	0.08	0.09	0.11	0.14	0.06	0.09
AE duration	s	16	14	29	14	19	22	19	19
PFC emissions, CO <sub>2</sub> equivalent*	CO <sub>2</sub> eq. kg/t Al	17	10	42	23	38	56	21	31

\*CO<sub>2</sub> equivalent is calculated as in Reference [8], using the Tier 2 method and SAR (Second Assessment Report).

The use of copper inserts in collector bars, which is being applied on relining basis, will further bolster the capability of the DX Technology and will be used either for lowering specific energy consumption or improving current efficiency or further amperage increase.

## 7. Acknowledgement

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## 8. References

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