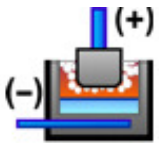
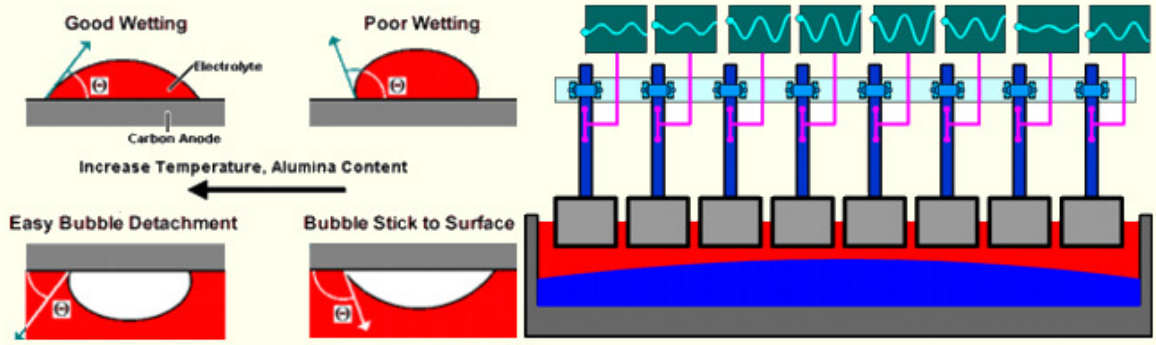
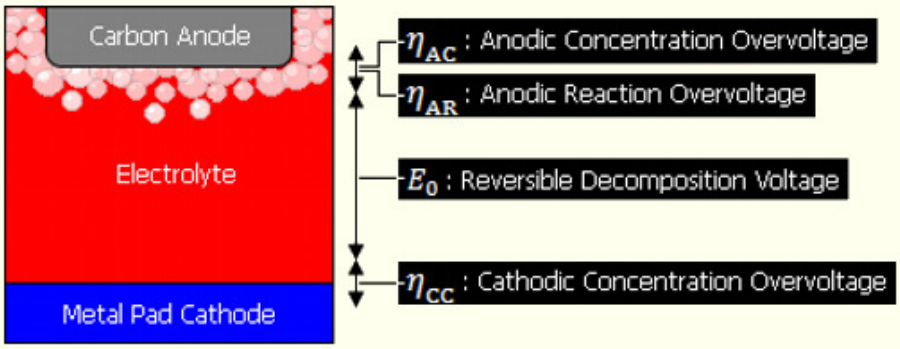


AlSem

Seminar and Workshop for Aluminum Smelting

			System $Na_3AlF_6 - AlF_3 - A$		System $NaF - AlF_3 - A$	
		R	c_{AlF_3}	c_{NaF}	$\bar{c}_{AlF_3}$	$\bar{c}_{NaF}$
	$R =$	1	$\frac{1 - c_{AlF_3} - A}{c_{AlF_3} + \frac{2}{3}\cdot(1-A)}$	$\frac{c_{NaF} + \frac{3}{2}\cdot(1-A)}{1 - c_{NaF} - A}$	$\frac{1 - \bar{c}_{AlF_3} - A}{\bar{c}_{AlF_3}}$	$\frac{\bar{c}_{NaF}}{1 - \bar{c}_{NaF} - A}$
System $Na_3AlF_6 - AlF_3 - A$	$c_{AlF_3} =$	$(1-A)\cdot\frac{1-\frac{2}{3}\cdot R}{1+R}$	1	$-\frac{2}{3}\cdot c_{NaF}$	$\frac{5}{3}\cdot\bar{c}_{AlF_3} - \frac{2}{3}(1-A)$	$1 - \frac{5}{3}\cdot\bar{c}_{NaF} - A$
	$c_{NaF} =$	$(1-A)\cdot\frac{R-\frac{3}{2}}{1+R}$	$-\frac{3}{2}\cdot c_{AlF_3}$	1	$1 - \frac{5}{2}\cdot\bar{c}_{AlF_3} - A$	$\frac{5}{2}\cdot\bar{c}_{NaF} - \frac{3}{2}(1-A)$
System $NaF - AlF_3 - A$	$\bar{c}_{AlF_3} =$	$(1-A)\cdot\frac{1}{1+R}$	$\frac{3}{5}\cdot c_{AlF_3} + \frac{2}{5}(1-A)$	$\frac{2}{5}\cdot(1 - c_{NaF} - A)$	1	$1 - \bar{c}_{NaF} - A$
	$\bar{c}_{NaF} =$	$(1-A)\cdot\frac{R}{1+R}$	$\frac{3}{5}\cdot(1 - c_{AlF_3} - A)$	$\frac{2}{5}\cdot c_{NaF} + \frac{3}{5}(1-A)$	$1 - \bar{c}_{AlF_3} - A$	1





Software & Consulting

GENISIM

About AlSem

AlSem is a seminar that teaches the theoretical and practical aspects to produce aluminum with the Hall-Héroult electrolysis process. The workshop provides a better and deeper understanding of primary aluminum production because the participants study and solve with AlWeb the examples and exercises discussed during the seminar. AlWeb is a serie of webpage's available of Peter Entner website http://www.peter-entner.com for aluminum smelting that helps to execute every days tasks of cell operation and to answer theoretical question of aluminum production.

Contents of AlSem

AlSem contains lectures of basic and advanced content. These lectures and the exercices may be selected according to the requirement and the available time. The course material consists of course notes pdf files and PowerPoint presentations.

Basic Topics

Principles of the Hall-Héroult-Process
- Hall-Héroult and alternative processes, history

Industrial Aluminum Production
- cell design, cell operation (computer control)

Mass Balance
- aluminium and gas production, alumina and carbon consumption

Properties of the Electrolyte
- bath chemistry (liquidus enigma) and analysis

Cell Voltage
- components of cell voltage

Energy Balance
- heat balance, heat loss

Current Efficiency
- cell productivity

Advanced Topics

Raw Materials
- alumina, carbon anodes, aluminum fluoride

Cell Operation
- optimum cell voltage, profitability analysis, alumina concentration, aluminum fluoride content

Measurements
- current efficiency, metal pad motion, side ledge, etc.

Environment, Emissions
- cell gases, carbon footprint, spent pot lining

Timetable

The following timetable was created with the assumption that the whole seminar content (basic and advanced topics) is delivered and all the workshop exercises are executed. Certainly a reduced version may be organized corresponding to the requirements and available time.

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00- 9.00	Introduction, Principles of Hall-Héroult Production	Mass Balance II	Cell Voltages II	Cell Operation	Measurements
9:00-10.00	Principles of Hall-Héroult Production	Properties of the Electrolyte I	Energy Balance	Cell Operation	Environment, Emissions
10:00-11.00	Industrial Aluminum Production	Properties of the Electrolyte II	Current Efficiency	Cell Operation	Environment, Emissions
11:00-12.00	Industrial Aluminum Production	Cell Voltages I	Raw Materials	Measurements	Environment, Emissions
12:00-14.00	**Lunch**	**Lunch**	**Lunch**	**Lunch**	**(Lunch)**
14:00-15.00	Mass Balance I	Workshop Mass Balance	Workshop Cell Voltages	Workshop Raw Materials, Cell Operation	Extra Workshop
15:00-16.00	Introduction AlWeb	Workshop Properties of the Electrolyte	Workshop Cell Voltages	Workshop Cell Operation	Extra Workshop
16:00-17.00	Workshop Mass Balance	Workshop Properties of the Electrolyte	Workshop Energy Balance	Workshop Measurements	Seminar Rap-up

Prices

The basic prices of the offered services are:

Lectures: 800 US$ per day, so for 5 days: 4000 US$
Seminar material: pdf course notes and PowerPoint presentations: 1000 US$

The number of participants for the lectures is not limited. The number of participants for the workshop should not exceed 15 persons i.e. then workshop groups should be formed.

The price of the entire seminar is hence 5000 US$ the first time it is organized for a given organization and 4000 US$ for any subsequent seminars assuming full 5 days seminars.

Contacts

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