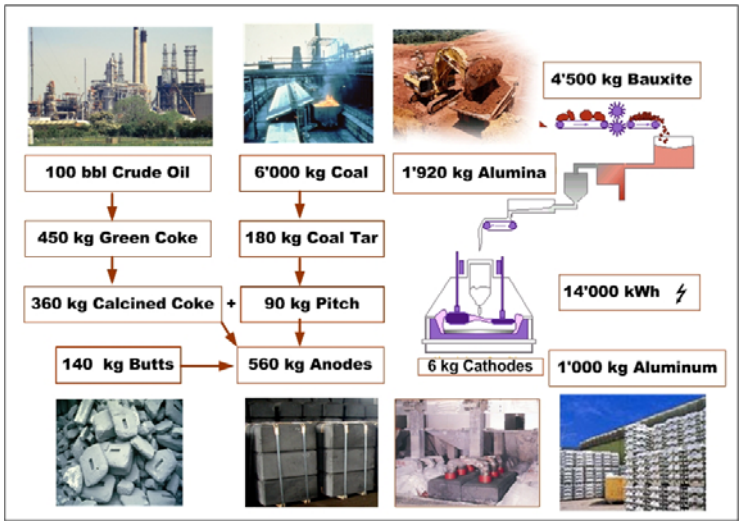
# The Coke and Carbon Network

## Introduction

The oil, aluminum and steel industries are closely linked through petroleum coke, a by product of the oil refining industry, which at the same time is an important raw material for anodes to be used as major component in the aluminum reduction process. Artificial carbon products (graphite, needle coke etc) used in the electrode industry are by-products from petroleum or coal tar pitch. They are used for manufacturing steel electrodes or cathodes for the aluminum industry.




## The Network

The Parties below have together the lateral knowledge which is required to optimize all steps from the selection of crude oil, definition of refinery process steps, coke calcination in rotary and shaft kilns and production of high quality anodes to be used in smelters as well as industrial production of artificial carbon and graphite products including needle coke from oil or coal tar used for steel electrodes.

- Mannweiler Consulting, (www.mannweiler.ch), Hadlaubstrasse 71, CH-8006 Zürich Switzerland represented by Dr. Ulrich Mannweiler provides project coordination between the parties, legal advices, business contacts to clients etc. He also provides the liaison to a qualified Chinese technology supplier for shaft kilns.
- R&D Carbon Ltd. (www.rd-carbon.com), P.O. Box 362, CH-3960 Sierre, Switzerland represented by Werner Fischer and Raymond Perruchoud provide technological concepts for raw material selection, coke blending, coke utilization for anode manufacturing. RDC cooperates closely with I Cubed Energy Consulting.
- AMINCO Resources, LLC (www.amincoresources.com), 81 Main street, Suite 110, White Plains, NY 10601, USA represented by Michael Wrotniak supplies carbon materials as well as complementary products to the global primary aluminum and steel industries.
- Research & Development Services W.L.L., (ageage@batelco.com.bh) P.O. Box 18432 Manama, Bahrain represented by Age de Vries provides engineering related questions and contacts to coke calcining plants.
- I Cubed Energy Consulting (www.icubedenergy.com) is a multidisciplinary world wide active company in the field of oil refineries regarding optimization, strategic planning services, process consulting etc. More details see on the web site. Robert Tufts from the Canadian Office is our contact person.
- LETIZIA Associates: italo.letizia@alice.it: Dr. Italo Letizia has a 48 years experience in the industrial production of artificial carbon and graphite mainly for the steel industry. He is recognized in the industry for his contribution in product and process development for carbon products.

# References of jointly performed projects

## Delayed Coking

1982- 1988 Venezuelan Coke Utilization Program

evaluation of heavy Orinoco crude oil, design, engineering and construction of a 5 tons per day delayed coking pilot plant, optimization (yield, coke quality) of the pilot plant, production of 500 tons of green coke, calcination of said coke in a coke calciner in the US, manufacturing of 1'000 tons of anodes and testing said anodes in a smelter in Switzerland.

1985 Evaluation of Venezuelan crude oils

For green and calcined coke production in four refineries with respect of product out-put, product quality, investment and production cost for LAGOVEN's Amuay, Cardon, El Palito, Puerto La Cruz refineries. Based on that 2 calciners installed.

1987-1989 STATOIL, Norway

Evaluation and optimization of crude/coke quality. Optimization coke quality in a rotary hearth calciner.

1997 USA REFINERIES

Study regarding utilization and quality of green coke from 20 US refineries.

1998 WINTERSHALL, Germany

Project study for improvement of green coke quality. Conceptual design and basic engineering for material handling and preparation after the delayed coker up to the coke calciner.

2001-2008 CHINESE REFINERIES

Study regarding utilization and quality of green coke from over 30 Chinese refineries. Follow-up of qualities used for anode production

## Coke Calcining

1969-1984 Coke Calciner ALUSUISSE Lake Charles, USA (today ALCOA)

Start-up of a 40 tph coke calciner from KVS; process and quality support.

1975- 985 Coke Calciner WINTERSHALL, Lingen, Germany

Quality improvement on calcined coke of Lingen's Marathon calciner.

1985 ESSO Karlsruhe, Germany

Start-up and dynamic optimization of a rotary hearth calciner.

1988 STATOIL, Norway

Dynamic calciner optimization of Statoil's rotary hearth coke calciner

1994 VEBA, Germany

Dynamic calciner optimization of VEBA's coke calciner.

1996 Great Lakes Carbon, USA

Evaluation blending behavior of different green cokes

1997-1999 CII. USA

Evaluation blending behavior of different green cokes. Optimization of Chalmette & Robinson's calciner with tertiary air.

1998-2003 ALBA Calciner, Bahrain

Project management (RDS) for the construction of a coke calcination plant. Various missions as consultant (RDC) of the calciner project regarding green coke supply, blending, calcined coke quality, process optimization etc.

2001-2002 Petrocoque Cubatao, Brazil

Improvement of calcined coke quality from refinery to the smelter. Installation of natural gas burners.

2003 VENCO Lake Charles

Calcining marginal green cokes. Calciner operates with tertiary air.

20034 Dumae coke Indonesia

Calcination tests in shaft calciner with a green coke that is not calcinable in a rotary kiln.

2001-2008 Chinese Green Cokes

Evaluation of Chinese petroleum cokes for the use in the aluminum industry. Review of over 30 refineries and characterization of produced petroleum coke. Use of green cokes in 8 different anode plants and production of 800'000 tons of anodes. Detailed knowledge and know how in shaft kiln technology for the production of calcined coke from uncalcinable green coke.

2006 Joint Seminar Venezuelan Aluminum and Oil Industries

One day seminar with representatives from the Venezuela Oil and Aluminum Industries to present technological possibilities for Venezuelan's oil industry and impact on aluminum production.

2008 Rain Calcining India

Plant audit for Rain calciner in India.

2007-2008 Carbon Production Center, Germany

Feasibility study for the Government of the Federal state of Lower Saxony in Germany regarding installation of a 1'000'000 tons anode plant, 60'000 tons cathode facility and 300'000 tons shaft kiln shaft kiln.

2008-2009 Shaft Kiln Technology for Brazil and the Middle East

Feasibility study for the installation of a 100'000 tons shaft kiln in Brazil and a 500'000 tons kiln in the Middle East, together with a well known and qualified Chinese Technology Supplier.

## Artificial Carbon and Graphite

1961 – 2002 Production and R&D Management for Electrode Plants in Italy, Poland and Germany (SGL) including new developments in graphitization (replacement of old graphitization Acheson furnaces by LWG (lengthwise graphitization furnaces).

2002 – today Participation and evaluation of new Needle Coke projects in Italy, India, China including cooperation with coke producers in the US, South America, Japan and India as well as technology suppliers (LUMUS and Japanese companies)